ILLUSTRATED
# ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 31. No. 19. WEEKLY. | NEW YORK, WEDNESDAY, NOVEMBER 10, 1897. | $3 PER ANNUM. Single Copies, 10 Cents.

Copyright, 1897, by Electrical Review Publishing Company, Times Building, 41 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

## VIEWS, NEWS AND INTERVIEWS.

At the recent convention of the American Street Railway Association at Niagara Falls, there were present 40 representatives of the weekly and monthly technical press. The street railway industry should be, and doubtless is, flattered at such attention.

Mr. J. J. Nate, who is well known among telephone men, and who is now general superintendent of the Standard Telephone and Electric Company, of Madison, Wis., has written to the Electrical Review as follows: "An article appeared in the *Telephone* recently, copied in part from a Chicago daily, relative to the use of a barb-wire fence as a means of telephone communication. Its use was one of necessity, and occasioned through the desire of two boys by the name of Grove, who had constructed a couple of rude telephones and wished to put them in operation; their scheme was a success. I recall further that the article called attention to the fact that this was probably the first use of a barb-wire fence as a means of telephone communication. The date of this experiment I do not recall, but it reminds me that in 1882 a gentleman came into my office at Chicago and made inquiry for a powerful calling generator, stating that he was operating some telephone sets on a barb-wire fence around his ranch in Texas, and that the generators supplied with the instruments were not strong enough to at all times successfully call the distant stations, and I am under the impression that this use of a barb-wire fence as a telephone line was perhaps the first on record. My object, however, in referring to the matter at this time is due to a little incident occurring in our own state within the last month. At a small neighboring town an exchange of some 30 subscribers is in operation, and connects with a number of interior towns. One in particular, about 15 miles distant, is visited quite regularly by traveling salesmen, who have in the past been in the habit of driving out to see their customers. Since the installation of the toll line, they frequently call up, and in that way avoid the expense of the trip. Recently a gentleman, representing a large grocery house, found it impossible to reach the town by 'phone, and after wasting nearly an hour in useless effort, ordered a rig from the livery and drove out to see his customer. On arrival he said that 'he had failed in his efforts to get them by 'phone, and wanted to know what was the matter.' The storekeeper said, 'Oh, that happens frequently; that fool, Johnson, must have the bars in his barb-wire fence down again.' In reply to which the genial representative said, 'Well. you had better send him a postal-card and tell him to put them up; we might want to use the telephone again.'"

Superintendent Frank C. Mason, of the Brooklyn, N. Y., Police Telegraph Bureau, has just rendered his annual report for the year 1896. The total number of messages sent and received by this bureau during the past year was 210,030. The force employed consists of a superintendent, chief operator, seven operators and four linemen. The department now has 569 miles of wire in use, of which 410 miles are strung on poles, 152 miles are carried on the elevated railroad structures, and seven miles are under ground. The department has in service 440 telephone sets, which are rented from the New York & New Jersey Telephone Company. There are also 10 central office connections. There is a satisfactory police patrol telegraph system in use.

A large gang of men is working night and day on the great dams now in course of construction at Mechanicsville, N. Y. When finished, these dams will form important parts of a plant which will supply the entire Hudson Valley in that vicinity with electric current. At the place selected for the building of the plant, a small island in the middle of the river divides the flow of water into two parts. Across the channels thus formed, concrete dams, aggregating 1,000 feet in length, are being erected. The power-house is to be built as a part of the western portion of the dam, and will contain horizontal turbines, placed below the water level, the dynamos being directly connected to the turbine shafts. It is expected that current will be supplied from this plant about the first of the year.

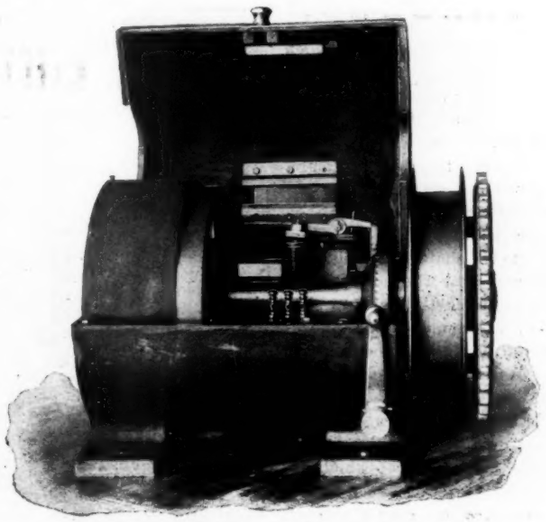


Fig. 1.—Interior View of Monarch Engine-Stop.

## THE SAFE CONTROL OF STEAM ENGINES.

### A DEVICE TO PREVENT ENGINES FROM RUNNING AWAY.

The graphic illustration and description of the terrible flywheel accident at the factory of the Providence Rubber Shoe Company, Providence, R. I., on September 22 last, published in the November issue of *Power*, suggests a consideration of this subject which ought to be of deep interest to every user of steam power. Much has been said during the last few years in the mechanical journals regarding these frequent accidents caused by "runaway" engines, and a good deal of severe criticism has been made on each occasion that they ought not and would not occur if the proper means of protection had been taken in the use of some one of the several devices that are on the market to prevent just this sort of thing. As far back as the September, 1894, issue of the *Textile World*, under the head "That Deadly Flywheel Again," the editor says: "August added another to the all too numerous flywheel disasters, this time being a 30-foot wheel of the Nassau Manufacturing Company's mill at Nassau, N. H., which seriously injured several of the operatives, and caused a loss variously estimated at over $10,000, to say nothing of loss of production and other inconveniences. While there was no actual loss of life, as was the case in the Amoskeag's terrible $75,000 wreck, it was simply owing to chance and not to any precaution, wise or otherwise.

"The cause was found to be 'racing,' pure and simple. The key holding the beveled gear on the bottom of the governor post dropped out and allowed the governor to come to a stop, throwing the full head of steam on the engine. In a few seconds its speed had increased the centrifugal force, at the rim of the flywheel, to bursting pressure.

"This time it was a gear-key, but the simple breaking of the governor belt, or any other slight disarrangement of the governor, would have had the same effect under similar con-

ditions. Here are two cases, one a terrible loss of life and $75,000, and the other personal injuries and the loss of over $10,000; but these are only two of the many accidents of this kind, which might easily have been avoided by a little forethought and slight expenditure of money. There is no excuse nowadays for these calamities, which are so frequently occurring, caused by a racing engine,

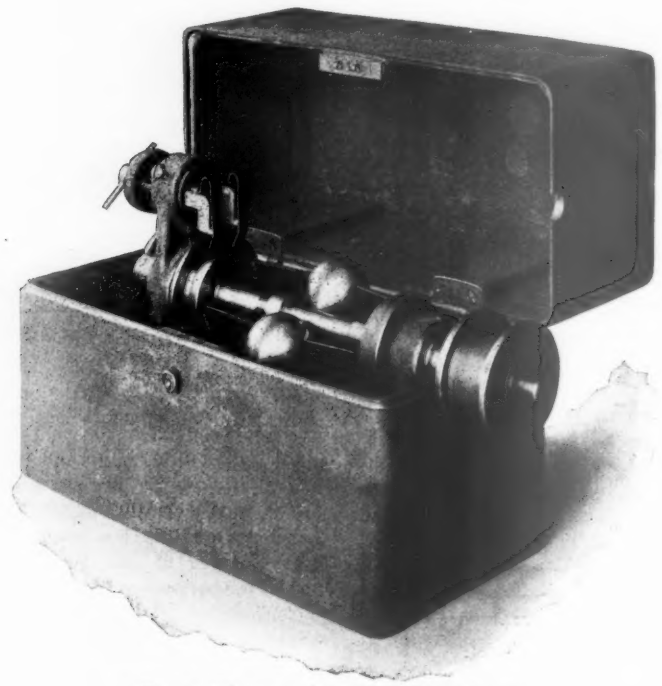


Fig. 2.—Monarch Automatic Speed-Limit.

in view of the fact that absolute safeguards have been invented, patented and are on the market, to effectually prevent just this sort of thing."

Many others of recent occurrence might be added to this fatal list, though, perhaps, not attended with such pecuniary loss as the Amoskeag disaster referred to, but in almost every instance there has been sacrifice of human life and large property losses. In the Amoskeag disaster, as well as in the recent accident at Providence, it was ascertained that both engineers succeeded in getting to the throttle-valve while the engine was racing, and in both instances the valve was found to be seated, in other words closed; but in each case the flywheel had attained speed to a bursting pressure, and both engineers were killed at their posts, as well as the operatives in various sections of the plant, by the flying segments of the wheel, all of which could have been easily avoided by the timely use of the proper appliances. One of the simplest and most effective of these devices now on the market, and in large general use, is the Monarch engine-stop and speed-limit, manufactured by the Monarch Manufacturing Company, of Waterbury, Ct. The extreme simplicity and absolute surety of this device may be seen and easily understood from the following description:

The machine or engine-stop consists of a cylindrical iron case, 18 inches in length by 12 inches in diameter, through which runs a one and one-quarter-inch horizontal shaft. Attached to one end of this shaft outside the casement is a combination drum and sprocket wheel. At the other end and inside the case is located an air dash-pot, nine and one-half inches in diameter by three inches in depth. To the shaft at this end is attached a dash or plunger which is operated by a coarse thread cut on the shaft at this point, running through a corresponding thread in the hub of the dash. In the dash also is a small bucket-valve which emits air sufficiently to allow the dash to be withdrawn easily from its seating by rotation of the shaft. In the dash-pot is also located a small vent valve to control the air pressure, which serves as a cushion to prevent the valve from seating too hard when the power is applied to the stop. Attached to the shaft on the inside of the case and near the combination drum and sprocket-wheel is a steel ratchet-wheel four and one-half inches in diameter. Running across the machine near the ratchet-wheel is an iron bridge, to which are attached three binding posts, which pass through insulated bushings in the bridge, the lower ends of which are connected by wires with the magnets, which are placed in a vertical position under the bridge. To the armature on the top of these magnets is attached a horizontal lever, which locks or unlocks at will the perpendicular lever to which is attached a vertical steel pawl, which is held in engagement with the ratchet-wheel described, by a brass spiral spring. Running from the sprocket-wheel on the machine or stop is a sprocket-chain connected with a similar sprocket-wheel attached to the throttle-valve stem just behind the hand-wheel (shown in Figs. 3 and 4), which makes a positive connection between the machine and the throttle-valve. This is stated to be the only device connected with and operating exclusively on the throttle-valve, which claim is protected by strong patents.

To the binding posts described are connected electric wires running to various portions of the plant, to which may be attached as many push-buttons as desired. Connected with these same binding posts in the machine are wires running to the batteries and speed-limit, which is attached directly to the main or flywheel shaft of the engine. The automatic speed-limit is a device which is used in connection with the engine-stop to cut off the supply of steam at the throttle-valve when an accident happens or a change of load occurs which causes the engine to race. The speed-limit (see Fig. 2) consists of an iron frame and casement, through which runs a steel spindle supported on ball bearings. Upon this spindle are affixed two hubs, one attached firmly to the spindle, the other movable. These hubs are connected by ordinary sensitive leaf springs which pass through round iron balls which fly outward under centrifugal force when the device is running according to the speed of rotation of the spindle and draws the movable hub toward the affixed hub upon the shaft or spindle.

Attached to the movable hub is a copper disk two inches in diameter, one sixteenth of an inch in thickness, which projects outward beyond the peripheral walls of the hub. Attached to one arm of the frame near the loose hub on the spindle is a block of non-conducting material, through which pass two horizontal copper bars. At one end of each bar are binding posts, to which are connected electric wires running to the engine stop. At the other end of these bars are attached copper or low brass fingers. These fingers are shaped and located so as to extend forward and make contact with the revolving disk that is attached to the movable hub on the spindle when the disk has reached the limit of its movements as adjusted. To these horizontal bars passing through the insulating block, as described, is attached a cross-bar or rod, through which passes a horizontal thumb-screw (as shown in Fig. 2). By means of this screw these rods or bars can be adjusted so as to perfectly regulate the speed of the engine to any desired excess above normal. In case the engine should commence to race for any cause by the increase of the rotation of the speed-limit, the centrifugal force would throw the balls outward, drawing the copper disk, which is attached to the loose hub on the spindle, to the point of contact with the finger springs, thereby closing the circuit and operating the stop, which immediately closes the throttle.

By many actual experiments where this stop is in use, it will close the throttle in less than one-quarter the time the engineer could do it were he at his post, with his hand on the valve-wheel. In case of accident in any portion of the plant, near or remote to the engine, by the simple pressing of the electric button, the throttle-valve is immediately closed. Connecting with, and operating through, the machine is a bell circuit of very simple character, to which is attached a gong of sufficient size to be heard by the engineer at any reasonable distance from the engine, so that when the throttle is closed for any reason, whether by push-button from any portion of the plant or by over-speed from the speed-limit, the bell circuit is also closed. This rings the gong continuously until the engineer or some one else returns to the machine to cut off the circuit by a simple insulating device connected with the machine or stop. This simple device prevents the possibility of the engine stopping on center, as it notifies the engineer that the throttle is closed. The power operating the stop, when released by electrical means, is furnished by a small wire cable, one end of which is attached to a weight of sufficient magnitude to close the throttle. This cable passes over a V pulley, affixed to some convenient point, and runs to the drum on the machine. When the engineer opens his throttle the cable winds around the drum drawing the weight upward, and it is held by the vertical pawl engaging the ratchet-wheel in the machine as described. This whole device is easily placed in close connection with the throttle-valve, either at the right or left, above or below the throttle-valve, as the

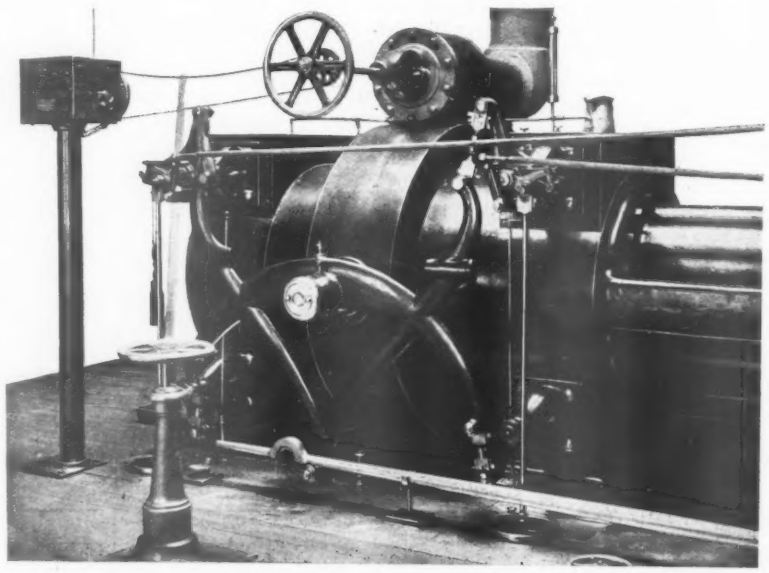


Fig. 3.—Monarch Stop Applied to an Engine.

occasion or conditions may require, entirely out of the way of the engineer, but is usually and more commonly placed upon a bracket affixed to the bed-plate of the engine or cylinder, as seen in Fig. 4, or upon an iron post or pillar, as shown in Fig. 3.

The wire cable used in this device is made expressly for the purpose by the John A. Roebling's Sons Company, and is guaranteed to sustain a weight of 790 pounds, while the general manager of the company states that they have never used a weight, under any conditions, that exceeded 45 pounds, which forcibly demonstrates an absolute safety from breakage.

The Monarch Manufacturing Company has recently moved its main office from Hartford to Waterbury, Ct., where it may be in closer touch with its factory at Derby, Ct. It has recently increased its capital stock, and is already enlarging its plant extensively in order to meet the increasing orders made upon it. The company has just issued a handsomely illustrated 26-page catalogue, which it will gladly send to any one, and furnish estimates upon application to its main office at Waterbury, Ct.

Mr. Gardiner C. Sims, of the Armington & Sims Engine Company, Providence, R. I., who was called to examine this device in the interest of a purchaser, recently, said: "The Monarch stop is practically an assistant engineer, with hand constantly on the throttle, who neither eats, drinks or sleeps; ever ready at the crucial moment to close the throttle-valve, and at a salary of less than four cents per day."

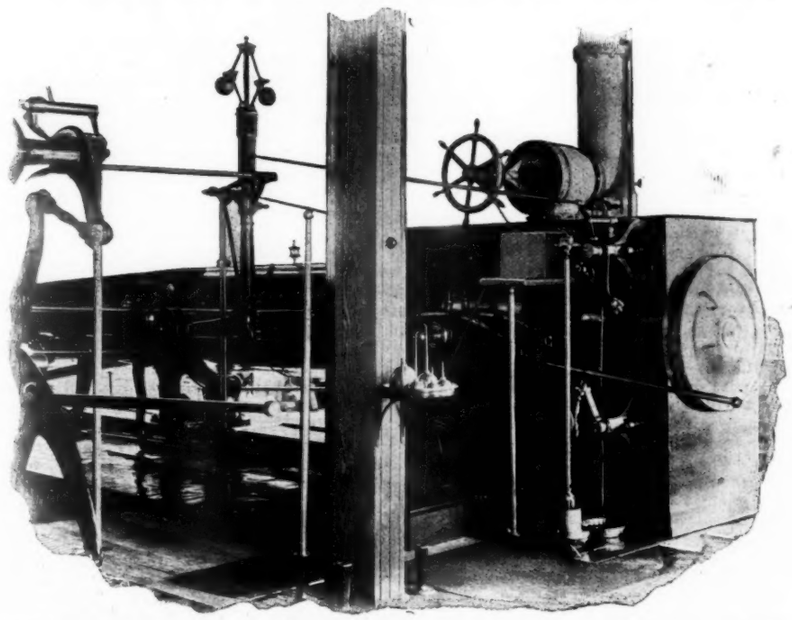


FIG. 4.—MONARCH STOP ON A 1,500 HORSE-POWER ENGINE ATTACHED TO CYLINDER BY BRACKET SUPPORT.

### Three Railway Items.

The Eau Claire, Wis., electric line is to be extended to Badger Mills and Chippewa Falls, Wis.

The Union Traction Company is seeking permission to extend its lines through various streets of Philadelphia.

The Buffalo Traction Company, of Buffalo, N. Y., has petitioned for permission to extend its lines into South Buffalo.

### Two and One-Half Miles of Electric Railway Built in 22 Hours.

The New York & Philadelphia Traction Company have been casting about for some time to find some one who could put in two and one-half miles of single track, including grading and overhead construction, within 24 hours, between midnight on Saturday and midnight Sunday. This procedure was deemed necessary in order to prevent the New Brunswick Traction Company from stopping the work by an injunction, as both companies were disputing the territory which was along the Easton road in the township of Bridgewater, N. J., between Bound Brook and Somerville. The New York & Philadelphia Traction Company received no encouragement from any reliable firm of contractors until the matter had been placed by them in the hands of a special committeee, with Mr. John Blair McAfee appointed to investigate the matter. Mr. McAfee had a meeting with Mr. C. G. Young, of J. G. White & Company, who had made an inspection of the territory, and on Monday, October 18, in Philadelphia, an agreement was made by J. G. White & Company to build the road, beginning work at midnight on Saturday and have a car in operation before midnight on Sunday, October 24.

The work was of such a nature as to require a vast amount of detail to be arranged for, as it was absolutely important that not the slightest hitch should occur to delay the work.

It was impossible to make any arrangements in Bound Brook or any of the surrounding places for the delivery of any of the materials or tools or engagement of men, and it was therefore decided to prosecute the work by operating from special trains.

An arrangement was made with the B. & O. Railway for a special train for the transportation of 250 men and four cars of tools and provisions from Baltimore; an additional section of six coaches with 300 Italians was arranged to be added at Philadelphia. It was extremely important that no one was advised of the destination of the train, and this was satisfactorily arranged with the officials of the B. & O. Railway, after assurances had been given that this was not to be a filibustering expedition. The cars had all been specially selected, and wheels and air-brakes thoroughly tested, and the very latest compound engines were assigned to this train. All the arrangements had been made with such secrecy that no one had the slightest suspicion of the destination. In arranging for this herculean work there were many important things to be considered:

1. To determine the force necessary to accomplish this work within the time named. This was left to Mr. John A. Wilson, superintendent of construction of J. G. White & Company, who had personal charge of the men on this work.

2. The transportation of so large a body of men with tools, appliances, horses, etc.

3. The satisfactory lighting of two and one-half miles of roadway, in order that the work might be carried on at night as expeditiously as by daylight. The lighting also involved the necessity for special arrangements to have the entire territory lighted within as short a time as possible.

4. To provide for the hauling and distribution of the large quantities of material required for the work. This includes the hauling of about 250 tons of rails, large quantities of ties, poles, etc.

5. The providing of shelter and lodging for the army of 600 men.

It must be very gratifying to J. G. White & Company that the entire construction was completed within the time required, and that the details had been so carefully planned as to render this possible even in the face of a terrific wind and rain storm, which raged from Sunday afternoon until Monday morning, and also in the face of the exasperating delays and unlawful arrests of every conceivable nature to take the foremen from the work and to intimidate the men; but on law and order they were so ably protected by Mr. Alva A. Clark, attorney of the New York & Philadelphia Traction Company, that the work was carried on successfully through the very great opposition of the New Brunswick Traction Company.

The special train left Baltimore 5.30 Saturday afternoon with a selected body of men, and the train was put on passenger schedule and but few stops were made. At Philadelphia rousing cheers were given to the 300 Italians who were to accompany the Orioles on their interesting expedition. The party was a merry one, and much amusement and entertainment was provided by interesting characters among the workmen.

Before the arrival of the train at Bound Brook, timekeepers had gone through the trains and supplied each man with large, conspicuous numbers which were pinned to their hats. This was to avoid any delay in taking time along the lines, as the numbers could be easily read and checked. The men by this time had taken such an active interest in the prospects of the work that, when word was passed that quiet should reign until the special had passed through Bound Brook, not a word or sound was uttered, and every blind had been closed until the arrival at the final destination—Finderne, located in the center of the work. On account of insufficient room on the railroad siding, it was necessary to quickly unload the 10 passenger coaches and to shift them to the next nearest station, and afterwards to place the freight cars in a proper location.

The unloading of the train was an interesting sight. First came the unloading of the lighting apparatus, which consisted of a large number of huge Wells flares, which had been shipped on from New York in a special car; these huge lights were placed every 600 feet along the two and one-half miles of the route. Then came the gasoline flares, which were hung every 50 to 100 feet along the line, and then the lanterns for the army of men, the foremen being supplied with red lanterns to enable them to be easily found. The unloading of all the lighting material was nothing in comparison with the task of filling the lamps and flares, but with a body of willing workers the entire route was fully illuminated within 90 minutes after the arrival of the train. Next came the unloading of the horses and tools. This was quickly accomplished, and the work of construction was begun at 1 o'clock Sunday morning. Everything worked on serenely until about 2 o'clock in the morning, when some men appeared and attempted to serve a copy of what was claimed to be an order to stop work. It was then, however, too late for the serving of papers, even had they been legal, and so the work progressed without interruption. It was not long before all the farmers

(Concluded on page 228.)

## SOME OF THE DIFFICULTIES EXISTING IN THE CONSTRUCTION AND OPERATION OF ELECTRIC STREET RAILWAYS.*

BY GEORGE W. KNOX.

(*Concluded from page 212.*)

Following up the idea that it is the first wrong step that counts, our whole aim must necessarily be to make as few mistakes in the construction as possible, for it is an easily demonstrated fact that the cost of operation depends largely upon the method of construction. It is an absolute necessity that we look ahead and plan against all kinds of speculative disaster, ignoring, if you please, in this case, the teaching that "we should not cross the bridge until we come to it." A little foresight, which results in preventing an accident, will probably mean the saving of the profits for many days' operation, one of the examples being, with ordinary conditions in the installation of overhead work, is the use of but one insulation between positive and negative. For the first year or so, this will be found sufficient, but a little later on the insulation begins to deteriorate, and there follow frequent short circuits and burn-outs, which stop traffic and entail an expense many times the cost of the additional insulations, which would insure, to a reasonable extent, against such leakages and burn-outs. It is not fair to owners of the majority of the electric railway properties to say that they have worked on the retrenchment idea as regards expense in putting in the system, as universally they have been liberal with their money, but where they are to be censured is in the fact that they have not familiarized themselves more fully concerning the methods of installation. They have been inclined to leave the question entirely to the honesty of the contractor or supervising engineer, who was not necessarily dishonest, but a man who knew a good thing when he ran across it, and perhaps slighted the work accordingly.

Among the most important matters to study for economy connected with construction and operation is the supply department. There is an immense sum of money needlessly squandered in supplies and repairs for an electric road in a year. One of the causes of this waste lies in the fact that the roads have not yet arrived at a standard in the design of the apparatus which they use, to which too much importance can not be attached. Every road should be its own designer of all articles used, for why should the manufacturer be better able to determine than you what is required. You are on your own grounds, know exactly the conditions to be met, and are in constant touch with the difficulties as they arise, and are far better able to devise the remedies than is the manufacturer miles away, who perhaps has only his own experiments and a confusion of theoretical speculations to rely upon.

*Read before the New York State Street Railway Convention, Niagara Falls, N. Y., September 15, 1897.

I mean in no wise to decry the assiduous and most excellent work of the manufacturers of electrical apparatus. It was and is a field of necessary inventive development, and the manufacturers are sparing no effort or expense in their endeavors to supply the trade with the improvements in demand, but the unwary railway man has had an immense amount of experimental clap-trap machinery inflicted upon him, all of which has cost dearly, and which is still maintained at a sacrifice. It is a lamentable fact that we have not done more than we have towards correcting this evil.

Along this line another evil for which the railway man in his efforts to save money is in part accountable, is in the shaving of prices on material to the extent that it has resulted in competition being so sharp among the manufacturers of electrical supplies that they have adopted the piece-work plan in order that cheapness may be secured, thus turning out upon the market apparatus that was not gotten out for efficiency, but to fill orders. Of course, these articles have been built according to specifications, and stood the shop test, but there is demonstrated an entirely different proposition when this apparatus is put to actual use; it is then that we see the bad effects of the hurried and slighted work of the piece-workers. To free ourselves of these troubles, we must be more careful in getting out the specifications and checking up the material received. The most carefully prepared specifications in detail should go out for every piece of apparatus used. You will then find that your supplies are coming to you made up in the proper manner, your supplyman knowing that should he send out a mixed up and defective lot of material, it will be promptly returned to him with charges "Collect."

To be able to get out the specifications needed it requires a certain amount of experimental work, and how far to go with this experimenting is a problem requiring the keenest discretion. Experimental work should only be encouraged and allowed by a company to the extent of having in view the elimination of an existing money-wasting evil. The testing, making of new designs and patterns, with perhaps the subsequent throwing in the scrap heap of the article gotten out to conform to some pet theory, when kept track of, is found to be a tremendous waste of money. Experimental work should, however, be encouraged as far as it is profitable in the way of stimulating sagaciousness and promoting adaptability on the part of the men handling the work, but all experiments should be allowed only as passed upon by the management of the road, who should be fully competent to determine the probable practicability of the theory proposed. In making up and buying supply parts one of the factors of economy lies in the bulk to be used. Of course, the greater the amount purchased the greater the saving. I would, though, strongly advocate not getting too great a quantity of stock of any kind of material on hand, as the defects developing often require the complete changing of designs, with consequent scrapping of all material in stock.

Another serious difficulty to be considered in connection with operation is the inefficiency of the motormen. I concur with a railway manager who once said: "Motormen, like poets, are born, not made." There are motormen who will operate a car day after day, year in and year out, without the slightest accident or complaint while others are constantly having wrecks, and their cars are always being run in the depot out of order. In the calling of a good motorman, we have a position with more responsibility attached, perhaps, than the position of an engineer of a steam railroad. A motorman, of course, has not in trust property that has the value of a steam railway train, but his field of operation lies where there is a greater menace to life and property (for which his employer is responsible in case of injuries), than with a steam railway engineer. A trustworthy motorman should be required to pass a physical examination, possess a cool, collective temperament, judgment in cause and effect of ideas in general, and have a fair amount of mechanical ability. He should be obliged to undergo the most strict examination as to his fitness in these requirements, and in addition be thoroughly conversant with the correct methods and rules of how to handle the equipment. The board of examiners for the fitness of employés on street railways will be able to make a better showing in efficient operation than most other departments, by giving more attention to the examination and instruction of operators, and that there is needed improvement in this particular is evinced by the magnitude of the accident account, which is due mostly to the operators not being properly schooled in the work they are handling.

I do not believe in attempting to educate motormen to any extent in electrical knowledge, as it has been proven that it is a waste of time, and nothing is accomplished by giving them an insight into, and encouraging them in determining the cause and remedy of some electrical trouble with which they may meet on their cars while on the road; you have men with all kinds of theories wasting the company's time in tearing apart and dissecting the equipment, and perhaps not then locating the trouble, at the same time they are undoubtedly blocking the line; where, had they, after failing with the simpler methods of locating the trouble, called for an emergency crew, or been pushed into the depot, they would have been doing much better service. There are, of course, some cases where it is excusable for men attempting the locating of trouble on their cars, but, as a rule, it is found to be the wrong practice. If they understand the brake mechanism, the proper manner of applying the power into their motors, how to cut out a disabled motor, and the rules as given in the rule books, they will have about all they are able to master. A good, bright, interested motorman, or other operator on the system, upon noticing anything wrong with the equipment should be educated in, and made to feel that it is his first duty to report everything coming under his observation that is working to the detriment of his company, and he should have this so impressed upon him that he will feel uneasy about his position until he does so.

It may be asked, What is to be done with employés in cases of carelessness and consequent losses through their actions? Of course, it is out of the question to always avert accidents or mishaps, and specific rules can not be laid down defining what is to be done in handling every case, other than by saying it depends mostly upon the ability to get the right kind of men and to instruct and impress upon them that the burden of preventing such losses rests entirely with them. It is well to remember in disciplining men for offenses or carlessness in their work, that if they have clean records in the way of good intentions, they should be given another chance; as they will in all probability improve as a result of their experience and make valuable employés for the company.

In placing a man in charge of work or a department, he should be given the full responsibility of his position; then he will take an interest in what he is doing, have a little company of his own, so to speak, wherein he tries to save the dollars to the extent that he would were it his own. That is the way he should feel and act, and if he does not, his place can not be filled too quickly. A company should, however, be governed with all cautiousness in making changes with heads of departments, also operators in general. A man assuming a new position usually comes loaded down with fertile ideas. They may have fitted perfectly the conditions existing at his former location, and, believing that it is a poor rule which does not always work, he immediately proceeds to put into effect his ideas. Some of them may be good, but, as a whole, by the time he has tried all of them, the company is, in the long run — unless heretofore there existed a deplorable state of affairs— liable to lose money by his practices. I know of an excellent piece of railway property which should be paying good dividends. The company was born at a time when the experimental stage in electrical apparatus was well under way, thus enabling the selection of a fairly first-class equipment. They spent plenty of money on their installation, but as soon as the road was equipped, the practice of changing management every three or six months was adopted. This resulted finally in their having about every style of apparatus. One of the managers came to the conclusion that he could make money by scrapping a style of motor he found on the road, so back in the corner they went. When his six months had expired, and the other fellow came on, he said he could make those motors go all right by changing their windings and otherwise fixing them up, and they were dug out of the scrap pile, the rust scraped off, new windings of field and armature substituted, and the motors are now in operation. This practice cost money. There is nothing at all strange that this road should be struggling alone for existence in the hands of a receiver, and I will not believe that overstocking or the hard times had all to do with its being in this position.

As a rule, the general condition of affairs out on the line and in the depots and stations of street railways is in a much shabbier state than exists in other lines of business. This is partially on account of the apparatus used being out in the middle of the street, or back, may be, in an old, dark barn, where no one really expects to see good order and cleanliness prevail; but it is a most serious mistake to allow this state of affairs to exist. Besides being directly wasteful of itself, it has the effect on every man connected with the company, of making him generally careless and neglectful in his work. Out on the line it breeds contempt for the whole system in the public eye, and will act as a barrier to getting further concessions for lines. I can call to mind a repair depot, where the floor of the shop part is as clean as the floor of a Dutch kitchen, the walls and ceilings are neatly whitewashed, and there is an individual place for every repair part used, from the cotter pin of the trolley wheel to the truck wheels of the car. Any repair man could be blindfolded in this depot and yet he would be able to go straight to and get any article of repair needed. There is no time

lost in pulling out and hauling over material to find what is wanted. The results obtained by reason of these practices are highly profitable, and wonderfully gratifying to the management. In point of neatness of cars, a minimum in the number of car trouble reports and amount of material used in repairs, while the car expense per day is no greater, and in most cases less than that of other depots working under like conditions. Much valuable time is lost and money thrown away by roads which are keeping so many records on matters pertaining to operation. Where a few records may be gotten out with a view of demonstrating that a leak is going on in some line of the work, or for the purpose of comparison in spurring some of the departments up when they are inclined to be negligent, there is, of course, money in it, and in fact it is necessary, in order that the work may be handled intelligently, but where you have your men spending their time in keeping track of how long a certain armature ran, the length of time it takes to make repairs of a certain part of the motor, etc., which records are rarely referred to, and should one want to use them, it would be necessary to spend as much time as it originally took to get them out in looking them up for use—it is all a waste of time and money. The man in charge of a department should be able, when called upon, to show exactly what it is costing to perform any part of the work under his charge, but he should be able to have this knowledge without the constant keeping of a lot of records.

One of the most commendable practices employed in the maintenance of a street railway is the regular calling together of the heads of the different departments, for consultation on matters pertaining to their respective departments. The details and new complications constantly coming up concerning the work are so varied and numerous, and the men actually handling the work have such an excellent opportunity of observing and dealing successfully with the difficulties arising, that their reports at once place the situation of affairs panoramically before the management for action. Some serious trouble with the equipment or operation may be going on; some one man, perhaps, has a way of remedying the difficulty, which the others had not thought of; and again, practices that are extravagant may come to light during these meetings, so that those who have not tried this plan will find it a most valuable adjunct in methods of operation.

The subjects mentioned are, I know, being constantly thought about and worked upon by all street railway men, and are well understood by them, but there is no denying the fact that there exists with us in our work at times an unjustifiable and inexcusable amount of carelessness, which results in the property depreciating as a money earner, to the extent that the holders of street railway securities become disgusted, withdraw their holdings, the receiver is appointed and the road is branded as a failure. The way of preventing the most of these cases rests with the men who are actually handling the equipment, in assisting the management in keeping down expenses. How far this is accomplished resolves itself into the extent to which we go in getting the most practical men who will be able to adapt themselves to and handle efficiently the conditions existing in their respective lines of work; and there must be constant vigilance on the part of heads of departments in taking advantage of the advancements being made, and in thoroughly and constantly checking every man and his work.

### Quick-Break and Barrier Switches.

Of the switches used by the General Electric Company upon the alternating-current switchboards manufactured at its works in Schenectady, one is the double-break switch, commonly called T–H. This has recently been improved by placing barriers between the blades, making it satisfactory for use on circuits with a potential up to 2,300 volts. The other is the so-called "safety" switch, which has the contacts on the back of the panel, while the blades are on the front. When this switch is closed

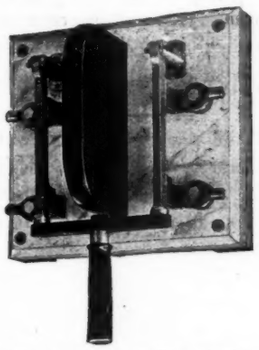


FIG. 1.—SWITCH WITH BARRIER.

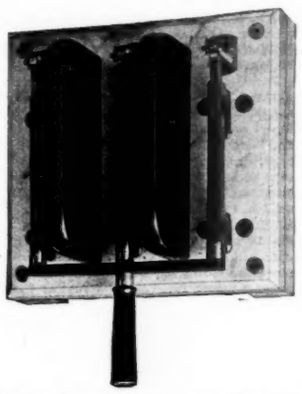


FIG. 2.—SAFETY SWITCH WITH BARRIERS.

the blades pass through holes in the marble and enter contacts. Barriers are also placed between the blades of this switch. The blades are also insulated from the metal back which holds them. Thus, when closed, no current-carrying part of the switch is exposed and the chance of shock becomes almost impossible. For higher voltages and inductive loads, the switchboards being special, specially designed switches are constructed to meet the requirements of the case.

The quick-break switches for use on circuits of nominal 500 volts, also manufactured by this company, are constructed with a view to obtain the greatest accuracy. The switch-blade contact consists of two pieces laid edge to edge, and connected to a common hinge. They are also connected by a pair of spiral springs, one on each side. Both sections of the blade make connection with the contact clip. In opening the switch, the outer section of the blade, to which the insulated handle is attached, is drawn to an angle of 30 degrees before the inner section moves. The inner half of the blade then begins to move, forced from the clip by positive action; as it leaves the clip it is drawn smartly up to the outer half of the blade by the action of the tension springs. The result is an extremely quick break and a wide gap, over which an arc can not hold. Switches of this type are made in capacities from 50 to 5,000 amperes at 750 volts, are constructed for both single and double throw, with or without bases, with either front or back connections, except with the 1,800, 3,600 and 5,000-ampere switches, which are not furnished with bases unless on special order. Single-pole switches, three-point, four-point, etc., are also manufactured by the General Electric Company, and are of great convenience in many cases. They swivel at the hinge connection and may control any reasonable number of circuits. Like the standard switches, they are built with bases, or back connections for switchboards as desired. The base of the 50-ampere switch is of porcelain; of the larger sizes slate.

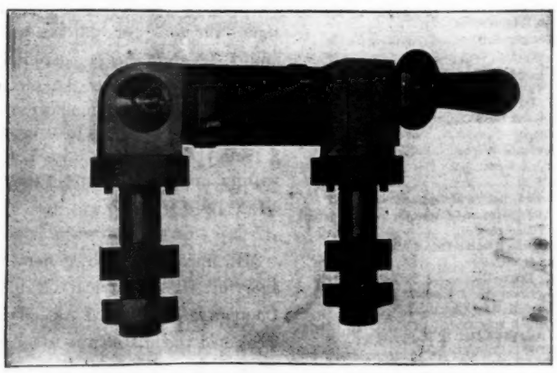


FIG. 3.—QUICK-BREAK SWITCH WITHOUT BASE.

### Thomas A. Edison.

[*From the Baltimore American.*]

Mr. Edison has long been regarded as one of the most astonishing men of the age. He is modest, as all really great men are, going about his work always in a quiet sort of way. There is nothing of the boomer about Edison.

If the man who makes two blades of grass grow where only one grew before can be called a benefactor, what shall he be called who has brought into being inventions that have been the means of saving many hours of labor, and that have made possible things the generation that preceded him would have said were impossible?

## TELEPHONE NEWS AND COMMENT.

The Pennsylvania Telephone Company has completed its second trunk line from Carlisle to Harrisburg.

C. C. McNutt and others will establish a third electric lamp plant in Warren, Ohio, to employ about 100 men.

The Central Union Telephone Company is building its line from Galesburg to Quincy, Ill., through Plymouth.

The Interstate Telegraph Company, of St. Louis, Mo., has been incorporated by H. L. English, D. J. Sullivan, J. Rueckert, and others. Capital stock, $20,000.

The work of erecting the telephone poles from Orrville to Doylestown, Marshallville, Smithville, Burton City and Wooster, Ohio, is about completed, and the line will be in operation in a short time.

J. Thomas Brown has entered suit in the Circuit Court against the Cumberland, Tenn., Telephone and Telegraph Company to recover damages for personal injuries to the amount of $1,999.50.

The Crestline Telephone Company, of Crestline, Ohio, has been incorporated with $6,000 capital stock. The object is to construct and operate a telephone exchange in Crestline with toll lines extending to Bucyrus. Incorporators: W. S. Johnson, Frank A. Huffman, Guy Huffman, Henry I. Johnson and Edward R. Tarr.

The East Tennessee Telephone Company will extend their long-distance telephone system and a line is to be constructed to Bristol, Tenn., and Lexington, Ky. The new line, it is stated, will cost over $100,000. The Bristol circuit will connect Chattanooga with New York, Boston, Philadelphia, Baltimore, Washington and other eastern cities. The second line to Lexington will give Chattanooga direct communication with Cincinnati, Louisville and Chicago. Work on both lines will commence at once.

The Middleburg Telephone Company has been incorporated to maintain and operate a telephone line through the village and town of Middleburg, Schoharie County, N. Y. The capital stock is $1,000, and the directors are Christopher S. Best, Daniel D. Frisbie, J. Edward Young, Alonzo Almy, Menzo W. Baker, Jerome B. Badgley, Albert E. Requa, Dow Beekman, Charles W. Vroman, John H. Wecke, George L. Danforth, Jacob L. Engle, John H. Cornell, Wellington E. Passler and William H. Neville, of Middleburg.

Mr. Morgan Brooks, of the Electrical Engineering Company, Minneapolis, Minn., visited New York city last week.

# Electrical Review

**Times Building, 41 Park Row,**

*P. O. Box 2339.* **NEW YORK.**

*EDITOR:*
**CHARLES W. PRICE.**

*ASSOCIATE EDITOR:*
**STEPHEN L. COLES.**

*ADVERTISING MANAGER:*
**STEPHEN H. GODDARD.**

*REGISTERED CABLE ADDRESS:*
**"ELECTVIEW," NEW YORK.**

**1546 "CORTLANDT," TELEPHONE CALL.**

*WESTERN OFFICE:*
**CARL E. KAMMEYER, Representative,**
**1627 MONADNOCK BLOCK, CHICAGO.**
*Telephone-Harrison, 475.*

*LONDON OFFICE:*
**HENRY W. HALL, Representative,**
**42 OLD BROAD STREET, LONDON, E. C.**
**News, Subscriptions and Advertisements.**

Subscription to the
**ELECTRICAL REVIEW.**

**One Year, United States and Canada, - $3.00**
**One Year, Foreign Countries, - - 5.00**
**Single Copy, - - - - - - - .10**

**Copies can only be supplied for one year back at 25 cents each.**

## Special Notice to Advertisers.

***CHANGES for advertisements must be in this office by Friday noon for the following week's issue.***

***NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.***

**NEW YORK, NOV. 10, 1897.**


## CONTENTS.


| | PAGE |
|---|---|
| Views, News and Interviews | 223 |
| The Safe Control of Steam Engines | 223 |
| Three Railway Items | 225 |
| Two and One-Half Miles of Electric Railway Built in 22 Hours | 225 |
| Some of the Difficulties Existing in the Construction and Operation of Electric Street Railways | 226 |
| Quick-Break and Barrier Switches | 227 |
| Thomas A. Edison | 227 |
| Telephone News and Comment | 227 |
| The Rubber-Covered Wire Combination | 228 |
| Wall Street and the Electrical Stock Market | 229 |
| The Northern Electric Company, of Baltimore | 229 |
| Replacing Insulators On a 10,000-Volt Live Circuit | 229 |
| An Unusual Trolley Accident | 229 |
| Kellogg-Pierce | 229 |
| Low Joints—How To Prevent Them | 230 |
| Switchboard Potential and Current Indicators | 230 |
| Electric Light Flashes | 230 |
| Construction and Maintenance of Car Bodies and Trucks | 231 |
| A New Arc Lamp Hanger | 231 |
| Electric Railway Notes | 231 |
| Three Accidents | 232 |
| Discipline of Employés | 233 |
| Advance Information | 234 |
| Jersey Trolley Cars Must Have Vestibules | 234 |
| Municipal Electric Light Plant for Dunkirk, N. Y | 234 |
| Kindred Interests | ix |
| Electrical Patents | x |


## INDEX OF ADVERTISERS.


COVER PAGES.

| | PAGE |
|---|---|
| Abendroth & Root Mfg. Co., boilers | xiv |
| American Electrical Works, insulated wire | i |
| Babcock & Wilcox Co | xiv |
| Bristol Co | i |
| Bunnell & Co., J. H., dry batteries | i |
| Clonbrock Steam Boiler Co | xiv |
| Columbia Incandescent Lamp Co | i |
| Crefeld Electrical Works | i |
| Crocker-Wheeler Electric Co | i |
| Day's Kerite, insulated wire | i |
| De Veau & Co | i |
| Diehl Manufacturing Co | ii |
| Electric Appliance Co., supplies | i |
| Goldmark & Wallace, "Koch" dynamo brushes | i |
| Helios Electric Co., arc lamps | ii |
| Imperial Porcelain Works | xiv |
| Iron Clad Rheostat Co | i |
| Leffel & Co., Jas | xiv |
| Lombard Water-Wheel Governor Co | xiv |
| McKenney & Waterbury | i |
| National India Rubber Co | i |
| New York Insulated Wire Co., Grimshaw wires and cables | i |
| Okonite Co., insulated wires and cables | i, xiv |
| Orient Electrical Co | i |
| Partrick & Carter Co., electrical supplies for housework | i |
| Partridge Carbon Co | i |
| Standard Underground Cable Co | i |
| Stirling Co., water-tube boilers | xiv |
| Thayer & Co | i |
| Van Nuis, C. S | i |
| Vulcan Foundry Co | xiv |

INSIDE PAGES.

| | PAGE |
|---|---|
| American Bell Telephone Co | xiii |
| American Electric Telephone Co., long-distance telephones | xiii |
| Andrews-Ryan Co., telephone engineers | xiii |
| Armorite Interior Conduit Co | vi |
| B. & O. R. R | x |
| Baker & Co., platinum | iii |
| Ball & Wood Co., engines | xi |
| Berlin Iron Bridge Co | xiv |
| "Big Four" R. R | vii |
| Bogart, A. L | ix |
| Brixey, W. R., Day's kerite wires and cables | viii |
| Buckeye Electric Co | xiv |
| Central Electric Co., electrical supplies | iii, vii |
| Central Mfg. Co | v |
| Chicago Edison Co | vii |
| Connecticut Pipe Mfg. Co | xiv |
| Dixon, Jos., Crucible Co., belt dressing | x |
| Duval, E. S., Jr., patents | x |
| Edison Decorative and Miniature Lamp Dept | viii |
| Empire China Works, porcelain specialties | xiv |
| Eppinger & Russell Co., Valentine subway electrical conduit | xiv |
| Eyanson & Armpriester | xiv |
| Faraday Carbon Co., carbons | viii |
| Farr Telephone & Construction Supply Co | xiii |
| Forest City Electric Co | xiv |
| Fort Wayne Electric Corporation | x |
| General Electric Co | v |
| Gordon-Burnham Battery Co | vii |
| Hamilton Publishing Co | x |
| Hudson Iron Co.—for sale | ix |
| India Rubber and Gutta Percha Insulating Co | xiv |
| International Correspondence School | vii |
| Keystone Electrical Instrument Co | viii |
| Lehigh Valley Creosoting Co., creosoted lumber | vii |
| Locke, Fred. M | v |
| Lockwood Long-Distance Telephone & Telegraph Co. of America | xiii |
| Lynn Incandescent Lamp Co | viii |
| Manhattan Electrical Supply Co | x |
| Manhattan Optical Co | x |
| Marshall, Wm., condensers | vii |
| McGill & Pomeroy, arc-lamp hangers | iii |
| Monarch Manufacturing Co | iv |
| New England Engineering Co | iv |
| New York Telephone Co | x |
| Novelty Electric Co., supplies | v |
| Ostrander, W. R., & Co., supplies | vii |
| Pacific Electric Co | x |
| Paiste, H. T., Co | x |
| Phillips Insulated Wire Co., wire | viii |
| Reisinger, Hugo | viii |
| Replogle Governor Works | iii |
| Ritchie, E. S., & Sons | v |
| Rodrigues, M. R | xiv |
| Royce & Marean, electrical supplies | x |
| Safety Insulated Wire and Cable Co | ix |
| Sawyer-Man Electric Co | vii |
| Siemens & Halske Electric Co. of America | v |
| Solar Carbon & Mfg. Co | xiii |
| Standard Air-Brake Co | viii |
| Standard Thermometer & Electric Co | iii |
| Stanley Electric & Mfg. Co | vi |
| Sterling Supply & Mfg. Co | xiv |
| St. Louis & San Francisco R. R | x |
| Tabor & Mayer | xiii |
| Treasury Department | x |
| Viaduct Mfg. Co., telephones, etc | x |
| Washington Carbon Co | iii |
| Western Electric Co | iv |
| Western Telephone Construction Co | xiii |
| Westinghouse Electric & Mfg. Co | xi |
| Weston Electrical Instrument Co., measuring instruments | viii |
| White & Co., J. G., engineers and contractors | ix |
| Willard Battery Co., storage batteries | ix |


Congratulations are due from every citizen of Greater New York to the New York Telephone Company and the New York & New Jersey Telephone Company for their promptness and enterprise in collecting and tabulating the returns of the recent election. The complete and accurate system adopted by these companies enabled the general result to be known to every telephone subscriber who cared to know within three hours after the polls had closed. The bulletins sent out subsequently were wonderfully accurate.

In an article on "Discipline of Employés," by Mr. George H. Davis, published on another page, a great deal of common sense advice is given. It is worthy of the attention not only of electric railway men, but of every employer.

It is again rumored that all the elevated railways of Chicago are to be combined into one organization. It is said that a new corporation, with a capital stock of $50,000,000, will be formed to take over all the existing elevated railways in the city. If this is true, Mr. Charles T. Yerkes will be in control of the combined system.

We call attention to a description on another page of a method adopted by Mr. Wm. B. Jackson, of Detroit, of changing insulators on a 10,000-volt circuit while current is on the line. This is a matter of importance in high-tension installations which can not be shut down for repairs. Mr. Jackson states that his scheme is perfectly safe if proper precautions are observed.

It is stated that the suburban traffic of the Boston & Albany Railroad to Brookline and Newton, Mass., has been seriously cut into by the active and progressive operations of the various electric railway lines. The steam railroad company is beginning to find out that a passenger in a steam car does not like to stand up, and that when he is patronizing a high-priced transportation service he expects better accommodations. He is willing to stand up in a crowd on a trolley car, but he does not seem willing to do the same thing in a steam railway train.

Mr. Marcus Nathan, general manager of the Electrical Exhibition Company, of New York city, last week had the misfortune to sprain his ankle. His physician ordered him to remain at home for at least two weeks. As Mr. Nathan is head over heels in work connected with the electrical exhibition, which will be held in Madison Square Garden during May, he felt that he must be at his office. After some persuasion his physician consented to allow Mr. Nathan to spend a few hours a day at his office, provided he could get there without having his foot jostled or struck. Mr. Nathan sent out for a pair of crutches, practiced a little bit, and was ready to go downtown. As the manager of an electrical show, he realized that it was neither fitting nor proper for him to ride in a cab drawn by a horse, so he telephoned to the Electric Carriage and Wagon Company for an electric cab, which has since carried him up and downtown every day without harm to the sprained ankle.

### *THE RUBBER-COVERED WIRE COMBINATION.*

Referring to the editorial in the ELECTRICAL REVIEW of October 20, on the possibility of a rubber-covered wire combination, we are now able to say, from sources which give the information absolute authenticity, that the attempt has been carried to a point, practically, of consummation, making an organization on totally different lines from anything that has been done heretofore in wire matters. Other wire organizations or pools have been formed where each member continued to transact his own business and sell his own goods. In the rubber-covered wire industry it is proposed to form an entire consolidation by the purchase by a new company of all plants, stock, trademarks and the good-will of the various companies now manufacturing. The statement is made with emphasis that the new company proposes to reduce the price of rubber-covered wire. The projectors are confident of the ability of such an organization, in view of the immense savings in production, maintenance of property and very large economies in selling, to insure its dividends upon lower prices than those ruling at present. Final arrangements have been obtained from very many more than the majority of the existing companies; practically all the largest have now signified their assent, and the number directly affected as manufacturers will be 16 or 17.

The ELECTRICAL REVIEW desires to inform its readers that a considerable number of contributions have been received in response to its prize offer for the best letters of advice as to the proper training required for a young man to become an American electrical engineer. The number and high quality of these contributions are such that the committee of award, in whose hands they were placed for rating, has required more time than was expected to reach a decision. Announcement of the prize-winners will be made in an early issue of the ELECTRICAL REVIEW, and the winning contributions will appear shortly.

The recent blizzard in Colorado tore down over 3,000 miles of wire throughout the state. Manager E. B. Field, of the Colorado Telephone Company, says that outside of the business territory in Denver, where the company's wires have been placed under ground the telephone system in Denver has been practically annihilated.

### Wall Street and the Electrical Stock Market.

The week in Wall street has been reactionary. Securities have eloquently expressed their view of election returns, which were construed to mean an increase in the free silver sentiment in the West. A liquidating movement was started and helped along by disquieting rumors regarding the Spanish–Cuban situation. The ease with which stocks were forced upon the market indicated that the inflation of the September boom has not been entirely dissipated. Declines throughout the speculative list were quite heavy, while investment stocks and bonds suffered to a less degree. There appears to be nothing in the situation aside from sentiment, which renders securities any less valuable this week than last, and it is the opinion of many that the decline will shortly be checked. Railroad earnings continue large, trade reports satisfactory, and the foreign buying movement of our produce heavy.

In the electrical field there was very little of moment affecting securities outside of the general factors outlined.

During the week I talked with representatives of various electrical manufacturing concerns, and learned that business continues to multiply, and that it is now on a basis which guarantees full operations throughout the Winter. The majority do not hold the belief that this demand for apparatus is likely to advance prices. They say that the influence of the largest concerns is against such a movement, and is undoubtedly based upon a desire not to force competition or to antagonize buyers and the public. Smaller companies have no option but to follow this lead, despite the stationary prices. The margin of profit is greater, owing to economies which have been enforced, a round-up or termination of many legal actions, and the larger volume of business afforded. This, according to the Wall street point of view, renders the situation exceedingly healthy and is bringing the cheaper electrical securities into greater favor.

The active electrical securities showed comparative strength. Losses were not large in any instance, and a partial recovery occurred at the close of the week's transactions. Bell Telephone dropped from 259 to 250, and rallied to 253 on very moderate business. The course of the other so-called Boston electrical stocks was similar. Erie Telephone lost 3 points, touching 69, and recovered 1, and General Electric preferred touched 80, a drop of 5; subsequently it ralled 2. The reference in this column last week regarding the preferred stock of the General Electric Company created considerable interest in Wall street, and the opinion was quite freely expressed that an absorption of the stock by the company at current prices would be a very efficacious and economical way of settling for accrued dividends, and at the same time afford an excellent investment for surplus earnings which are known to be large just now. The only fixed charge the company is compelled to meet is $400,000 on its $8,000,000 debentures, fully 25 per cent of which it has in its treasury. No dividends have been paid for four years, and the net surplus is accumulating rapidly.

Electric Storage Battery came into notice again this week through the announcement that Gustav E. Kessler, of Kessler & Company, the well known bankers of this city, had entered the directory. There was also the customary statement of big earning, which for the year were estimated at something over $200,000. The stock ranged between 26 and 27¾.

The Sprague Electric Company is attracting considerable attention in the Street, and it is intimated that when the absorption of the Conduit company is completed the shares of the new corporation will be listed on the New York Stock Exchange, and that considerable activity therein may be looked for.

I understand that a portion of the stock of the Electric Vehicle Company, of Philadelphia, some $250,000 in amount, will be offered to the public at par about November 15. It is asserted that this amount has been underwritten. The total capitalization is $5,000,000.

The American District Telegraph Company has declared a quarterly dividend of one per cent, payable November 16. Books close November 10 to 15, both dates inclusive.

BAIN.

Wall street, November 6.

### The Northern Electric Company, of Baltimore.

The Northern Electric Company, of Baltimore, Md., has purchased the contracts, business, franchises and property of the United States Electric Light and Power Company, of that city, and is now filling its contracts. The new company was created by a special legislative act, which conferred upon it facilities enabling it to serve the convenience of its patrons and the public to a much larger extent than has heretofore been possible in the electrical business in Baltimore. The company has purchased and is now installing in its central station a complete new equipment which will furnish current for arc lighting, incandescent lighting and electric motor service.

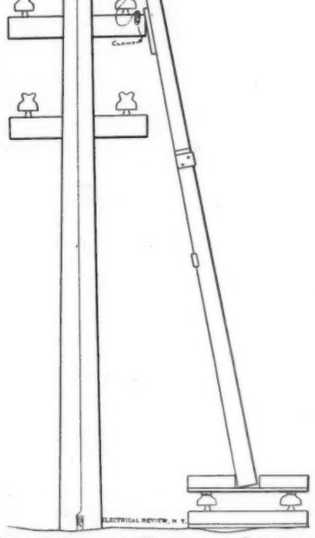
Readers of the ELECTRICAL REVIEW will be interested to know that Mr. J. Frank Morrison, ex-president of the National Electric Light Association, who has been connected with the electric light business in Baltimore since its beginning, has accepted the position of general manager, and will personally direct the practical operations of the company. The board of directors of the company consists of John M. Denison, president; Charles Marshall, vice-president; J. Frank Morrison, general manager; Fred M. Colston and C. M. Armstrong.

Mr. Herbert W. Smith has accepted a position with the Bibber–White Company, of Boston, as manager of that company's railway department.

### Replacing Insulators on a 10,000-Volt Live Circuit.

Mr. Wm. B. Jackson, of the Peninsular Light and Power Company, has written from Detroit the following very interesting description of his method of changing insulators on a 10,000-volt circuit while the current is on the line. In view of the facts that so many high-tension lines are being installed, and that from various causes it is often necessary to replace insulators, this description should be of value to many readers of the ELECTRICAL REVIEW. The accompanying sketch will assist in making the matter plain. Mr. Jackson's letter is presented through the courtesy of Mr. J. G. White, of New York city. It is as follows:

"The method I use in changing the insulators upon the 10,000-volt circuit is extremely simple, but, at the same time, quite safe, if due precautions are taken to have the apparatus dry.



SKETCH SHOWING METHOD OF CHANGING INSULATORS ON A 10,000-VOLT LIVE CIRCUIT.

"We use a 30-foot ladder, in two parts, so as it can be made of the proper length to catch the cross-arm. At the upper end a small board is put on having a hole in it of the right size to fit on the end of the cross-arm. For the ladder to stand upon we have a platform 30 by 30 inches square, having a lower part which has a pin with an insulator at each corner and an upper part which fits upon the insulators in the lower part. This upper part has two recesses for the feet of the ladder to fit in. When the ladder is in place, some one goes up and screws a small hand-vise upon the cross-arm. The hand-vise is of iron and has a piece of copper wire soldered to it. This wire is touched to the line wire upon which the broken insulator is located, and if everything shows all right, is wrapped around same. A three-foot stick boiled in paraffine is used in first touching the wires together. When the grounding wire is properly on, the man goes to work with bare hands and changes the insulators when the grounding wire is taken off and clamp removed.

"With a plant such as we have, it is an absolute necessity to be able to change the insulators at any time. The only time we can shut down without causing our customers trouble is between 3 and 4 P. M., on Sundays, and a bad insulator can not be left from Monday till Sunday; at least, should not.

"We have not found it necessary to take the voltage off any portion of the system for two months and 14 days."

### An Unusual Trolley Accident.

That was a curious accident which occurred in Brooklyn, N. Y., on last Saturday night. Two and one-half miles of trolley wire on the Ninth avenue division of the Prospect Park & Coney Island line fell to the street. A car at the Park Circle was being switched from an east-bound to a west-bound track, preparatory to making the return trip to Fulton Ferry. The trolley pole slipped from the wire and the conductor seized the rope, giving it a strong pull. The pole then became entangled in the network of span wires and broke several of them. The trolley wire, unsupported, sagged considerably, and the strain on the next span wire became too heavy to bear and it broke, and the one beyond snapped, and so on. The span wires acted like a row of bricks, the first one of which had been knocked down and the others following in order. The bystanders state that it was a wonderful sight to see two and one-half miles of trolley wire lying on the ground marked by a trail of blue fire and sparks. A wrecking crew was at once summoned and temporary repairs were quickly made. We believe this is the first accident of the kind which has been reported. It is certainly an unusual one.

### Kellogg-Pierce.

The marriage is announced, on October 27, of Mr. James Warner Kellogg, of the General Electric Company, Schenectady, N. Y., to Miss Louise Cook Pierce, of New Bedford, Mass., daughter of Mr. Andrew G. Pierce, of the Wamsutta Mills. Mr. Kellogg is an honor graduate of Lehigh University, whose experience began in the engine works of the Allis company at Milwaukee. He entered the service of the Edison General Electric Company as a draughting engineer. He has steadily risen, until to-day he is in charge of that important branch of the General Electric Company's business devoted to marine and isolated plant work. He has had the supervision of the electrical equipment of almost all the vessels of the United States Navy, and deservedly holds a high position in the esteem of his employers, comrades and business friends. The ELECTRICAL REVIEW wishes him all possible happiness in his new career.

Mr. J. E. Keelyn, president of the Western Telephone Construction Company, of Chicago, visited Philadelphia last week.

## LOW JOINTS—HOW TO PREVENT THEM.*

BY C. LOOMIS ALLEN.

Nearly every street railway company has a stretch of poor track, which, for good reasons, it is trying to use for a term of years, or until such a time as it is possible to rebuild with what is now called "permanent construction," and the greatest of the trackman's troubles in keeping this track in a condition for the operation of cars is the joint. In the majority of cases, if the joints that were placed on the rail at the time of the construction of this track remain in use, the bolts will become loosened and, at a great many joints, shear off. The supporting ties may be tamped solid, yet the joint will hold its proper place for only a short time.

In Syracuse, last Fall, during our reconstruction, we had a street 4,500 feet long, in which were double tracks. The structure was a 47-pound stringer rail, upon five-inch by seven-inch pine stringers, the ties supporting the stringers every five feet. It was our aim to save as much of this structure as possible and yet have a track structure in the street which would survive a period of five years' traffic. At the end of that time it is hoped that all the sewers, water, gas and conduits will be in the street, so that permanent construction can be built without being ruined during the process of construction of these underground structures.

The paving was removed and the stringer rails consigned to the scrap heap, the stringers and ties lowered two and one-half inches below the original grade. Ties were introduced between those under the stringers so that the spacing under the stringers was two and one-half feet between centers. To the stringers was spiked the Johnson Company's sixty-six one-half-pound girder rail which had been removed from track by reason of failure at joint. This rail had been laid on chairs and had become so worn at the joints that it was doubtful whether it could be used; but, aside from the deflected ends the rail was in good condition and not worn out. The ends of a great many of these rails were tested for deflection previous to laying, and in many cases three-sixteenths of an inch deflection was found. What effect traffic would have upon the ends of the rail after placing upon them the Weber joint was a result that was awaited with much interest. This joint was purchased with the idea of benefiting the rails, bringing them up to grade and in proper line. The rails were laid with broken joints with rail ends butted tight. No trouble was encountered in placing the joint, and the track structure was completed and paved in. It was our intention at the time of construction to operate on the track a day or two previous to replacing the pavement, and then to tighten the bolts once more firmly. The conditions of traffic would not allow this, and the structure was paved in without this second tightening.

At first the cars which were operated upon this track pounded considerable at every joint. As the construction of this track was completed just before the final freeze up last Fall the pounding was made more prominent by reason of the frost holding the track structure firmly.

In the Spring, after the frost had left the ground, the rails were examined, and although no metal was restored to the head of the rail, the ends of the rail had been brought up to grade and line. The bolts of some of these joints had become loosened so the paving blocks were removed at the joint and the bolts thoroughly tightened. This track is not as good a track as our standard nine-inch construction, but we have saved from the scrap heap rails that, without the use of these joints, could not have been used as relaying rails. This construction, we believe, will do the work we expected of it; *i. e.*, the carrying of traffic for a period of five years.

During the past four years girder rails nine inches in height, with brace plates and with joint plates of varying dimensions as to thickness and length, have been considered standard material for permanent construction, but the joint is still the weakest portion of the track structure.

Three things that are important in the solution of the joint question are as follows:

1. Materials used in track construction.
2. Manner of supporting the rails.
3. The location of the joints in relation to each other.

In the purchase of track material for nine inches construction, if the rails are all that are considered, and the selection of a suitable joint for the rail is passed upon lightly, one would naturally buy that which would give to him track material at the lowest cost per foot of single track; *i. e.*, the joint would be the cheapest joint purchasable. The other appurtenances, aside from the rail, would receive like treatment. But if, on the other hand, a good track structure throughout is desired, with a minimum cost of maintenance after the track construction has been turned over for operation, due consideration will be given to all track appurtenances before final decision is made to purchase cheap material. Good material throughout is necessary to good construction, and without it permanent construction can not be had. The best material purchasable to-day will be poor enough after 10 years of operation under electric traction.

Considering that good materials are economical, we will now turn our attention to the support of the rails. The support of the rails along the entire length is just as important as for the rail to be well supported at the joints. The greater the number of lineal inches of tie-bearing supporting the rails when the ties are well ballasted and tamped, the longer the life of the track structure. To give good support to the rails, ties should be placed as close together as it is possible to do so, and yet give room to properly tamp with the tamping bars the ballast supporting the ties.

The manner of fastening the rails to the ties should be carefully considered. Spikes that will give good holding power, and not split or cut the ties so as to injure them, should be selected. The joints in the rails upon either side of the track should not be opposite each other.

Rail ends of the same section very frequently show, upon being calipered, that there is a difference in their height, and when two ends like this are united by the joint, a pound or blow will result at this joint, causing a weakness upon that rail of the track. If another joint is laid immediately opposite upon the same ties supporting the poor joint, no matter with what care or in what condition the joint when laid may be, this pound or blow will have its effects upon the good joint, and it will not be long before two weak spots will appear in the track where, if the joints had not been laid opposite each other, there would have been but one; on the other hand, if the joints be laid broken, the pounding is transferred by the axle of the car, not to the weakest spot on the opposite rail, *i. e.*, the joint, but to the solid portion of the rail. The cost of maintaining to proper grade and line, track laid with broken joints is not so great as track having joints laid opposite, as when once repairs are needed, the latter will require attention a greater number of times. In the construction of permanent track to-day, street railroads have the joint question to face only half as many times as they did three years ago. Sixty-foot rails have cut the joint question in two.

We are laying in Syracuse the following construction at the joint, and from it have had no trouble: The joints are laid broken, with rails butted tight. Corrugated joint plates, nine-sixteenths of an inch thick and 36 inches in length, are bolted tight by means of 12 one-inch bolts, the nuts of which are held in place by the Young gravity nut lock. The ties at the joint are laid to form what is known as the three-tie joint; the center tie supports the rail ends equally, and the other ties are laid so that the ends of the joint plates are supported upon the center of the ties, thus giving three ties supporting the rail underneath the joint plate. The spacing under the rails, aside from the joint, is $1\frac{23}{100}$ feet between centers of ties, giving 32 ties to every 60 feet of track. The ties used are southern yellow pine, six inches by eight inches by eight feet, and they are supported by eight inches of broken stone ballast.

The question of low joints can not be solved by simply considering the joint alone, nor by considering everything else and omitting the joint. The whole track structure must be considered. The sub-grade upon which the ballast is placed must be made perfectly firm. The ballast must be of good thickness to give proper sub-drainage and thoroughly rolled to give firm support. The ties should be the best obtainable, and, as stated before, the closer spaced the better the track structure. The steel rails and their appurtenances used should be the best material that money can buy, and when this track material is properly assembled, the question of low joints should not arise for some time.

*Read before the New York State Street Railway Convention, Niagara Falls, N. Y., September 15, 1897.

SWITCHBOARD POTENTIAL AND CURRENT INDICATOR.

### Switchboard Potential and Current Indicators.

The Keystone Electrical Instrument Company, of Philadelphia, announces a new line of switchboard potential and current indicators designed to meet the class of trade requiring accurate and durable instruments at low prices.

The illustration shown herewith gives a general idea of the shape of the instrument and the character of the scale. The instruments are mounted in a tastefully designed case, finished in oxidized copper and well lacquered. The moving parts are mounted in jeweled bearings, the cases are dust-proof, and the instruments are not affected by external magnetism or changes of temperature.

While the prices at which these instruments will be offered are very low, yet it is claimed that none of the essential features of a thoroughly reliable instrument have been in any way slighted.

### ELECTRIC LIGHT FLASHES.

The Middletown, Ohio, Edison Electric Illuminating Company's plant has been sold by the sheriff.

The electric light plant of the Clinton, Ill., Electric Light Company has been destroyed by fire at a loss of $25,000.

The Kalamazoo, Mich., Heat, Light and Power Company has been succeeded by the Kalamazoo Gas and Electric Company, with a capital stock of $200,000.

The Worcester, Mass., Electric Light Company has petitioned for authority to issue $100,000 additional capital stock for the enlargement and extension of its plant.

At the annual meeting of the Edison Electric Light Company of Philadelphia, Pa., the following board of directors was re-elected for the ensuing year: Martin Maloney, William L. Elkins, Charles M. Swain, Samuel B. Huey, George S. Graham, Sydney F. Tyler and W. W. Gibbs.

Ellen G. Bassett, L. F. Bassett and Wm. Harris filed an action in the Superior Court on October 9 against the Redding, Cal., Electric Light and Power Company. The action is brought to recover $500 damages for breach of contract in furnishing water for irrigating purposes and in refusing to give title to property under an agreement.

At the annual meeting of the Standard Light and Power Company, of Montreal, Canada, the following were elected as directors: Messrs. J. H. Burland, Peter Lyall, W. S. Evans, W. McLea Walbank, L. H. Henault, Ste. Cunegonde; F. Dagenais, St. Henry, and M. P. Davis, Ottawa. At a meeting held subsequently by the board the following officers were elected: Mr. W. McLea Walbank, president; Mr. J. H. Burland, vice-president; Mr. E. Craig, secretary.

A verdict for $7,500 was last week rendered against the Brush Electric Company, of Baltimore, Md., in favor of Mrs. Alice B. Ray and Emily M. Ray, the widow and daughter of William F. Ray, who was killed by a live electric wire on June 4 last at Cline's bicycle establishment on West Baltimore street, where he was employed as salesman. As reported at the time, Mr. Ray had stepped outside the second-story window to fix a sign, when he caught hold of the wire to steady himself and was instantly killed. Five thousand dollars of the verdict goes to Mrs. Ray and $2,500 to her daughter.

## CONSTRUCTION AND MAINTENANCE OF CAR BODIES AND TRUCKS.*

BY ROBERT DUNNING.

As the life of a car body depends almost entirely upon the bottom framing, nothing but well seasoned and perfectly sound, straight-grained timber should be used. Ordinary kiln dried lumber is not suitable for car framing, and even when timber has been in the drying shed for a long time it should be given a couple of weeks' seasoning after its first working, for well dried timber will show a slight shrinkage after being worked. Too much care can not be used in the cutting of mortises and tenons to see that they are tight all the way round and all the way through. The placing of cross sills will be influenced somewhat by the style of car and motor equipment, and there is probably nothing better than strong diamond bracing to hold the frame square. Lead the mortises and tenons, and when the frame is driven together, put in the tie rods, draw up tight and put on corner angle plates and finally square and level up the whole work.

The framing of the platforms should be well considered and made to meet any emergency. The size of timbers will in any case be proportioned to the carrying capacity of the car. The application of the outside covering, inside lining and trimming should be carefully studied as to its efficiency in the covering of joints and to keeping the frame dry, as well as to its appearance. The main principle to be observed in the whole framework is to produce a combination truss that will offer the greatest resistance to any strain that may be imposed upon it, and the avoidance of the introduction of useless material.

The present tendency in painting is toward simplicity as to colors and ornamentations and is certainly to be commended from a practical standpoint. The use of a few colors, and those that do not fade quickly, make retouching easy and satisfactory, and reduce the cost of painting very materially. The neat effect of natural wood finishes in the inside of the car is also to be commended for beauty and long-wearing qualities. As to the methods of applying paint, any one which embodies the principle of good materials well mixed, carefully applied and cut down, will produce good results. Nearly every boss painter has some little difference in the method of handling his work, but if he is intelligent and unprejudiced he will produce good results.

In truck construction we have nearly as many patterns as there are of life guards, and each makes claims to embody some principle which no other truck has, and all other trucks are therefore fatally defective. With one the great principle of a perfect truck lies in the bearings, with another it is in the frame, another the springs, another the amount of traction, and so on, with additions, subtraction, multiplication and divisions, and the end is not yet. Taken collectively, the truck builders have wrought a great work, and when the day comes that produces a truck in which each of the principles they claim is brought to the perfection they now claim in each instance, we can cease our looking for improvement in that direction, and reflect complacently that Solomon was certainly mistaken when he said that there was no perfection under the sun. As it is, we must be content with the knowledge that there is one best truck on the market, and though each maker claims it is his, we still have the privilege of choice and can act accordingly, even to experimenting a little ourselves when we feel like exploiting a pet theory. The ideal truck is the one which gives the maximum amount of traction, rigidity of frame, flexibility of operation, ease of running, and the minimum amount of oscillation and weight. These and many minor principles go to make the perfect truck. How to attain them is the study of every mechanical engineer in the street railway business, and some outside. To enter into a discussion of the principles involved is impossible in this paper, as any one of them would require a long article, which time forbids, so we will pass on to the maintenance of cars and trucks.

THE DIRIGO ARC LAMP HANGER.

Perfect maintenance may be described as that which produces the greatest efficiency and best appearance extended over the longest period of time. The method of accomplishing this will differ in minor details under different conditions and service, but the main principles are the same. As to the car body, the words paint and varnish cover nearly the whole subject, and if the car be kept well varnished the question of painting, if well done in the first place, may be set aside for an indefinite time. A car in regular service should be revarnished once in nine months, or oftener if the locality in which it operates is subject to conditions which are specially injurious to varnished work, such as an excessive amount of smoke and coal gas in the atmosphere. Before retouching and varnishing have the joints of the car inspected, and if any indication of shrinkage or working is shown see that it is put right.

In the truck, besides the painting and varnishing, other conditions are to be met, for here the wearing parts demand constant attention and should be gone over every time the car is run into the house. You can not depend upon the driver or conductor to always report defects even though they are ordered to do so; their mechanical knowledge may be very limited, and as long as a thing works it is all right to them. In the matter of brake-shoes, see that the shoe sets true upon the wheel and is in perfect contact on the whole face; through carelessness in truck construction and the moulding of brake-shoes we often see them worn through at one end and scarcely touching at the other, and again worn in such a way as to show they were set diagonally to the face of the wheel. Test the brake, track cleaners, sanding apparatus and wheels, for you can not tell what may have happened to them while in operation, and it may mean the saving of life and thousands of dollars to the company if these things are constantly and carefully looked after.

In the matter of flat or skidded wheels, we all know the causes. We also know many remedies for the trouble, and have applied them, but the wheels continue perversely to skid, and will probably continue to do so as long as the braking power is applied to them and emergency stops are made. The regular sanding of the track has probably done as much good as anything that has been tried so far, but for the present there seems to be nothing better than to get as high a mileage contract as possible from the wheel-maker, with the necessary regrinding included.

To the electrical equipments all the previous remarks relating to testing and careful inspection apply with double force. The power which is so quick and ready when properly conveyed and guarded will vanish upon the least relaxation of vigilance, and leave disaster in its wake. How to properly care for motors, switches and wiring is also a subject too broad for this paper to attempt to cover, and only a few general points can be mentioned, one of the most important of which is cleanliness. Care in this direction will save many a breakdown, and it is hardly possible to be too thorough. Dirt may be a good insulator at times, but it is scarcely safe to trust it.

Insulation is another point to be carefully scrutinized and the careful and solid connection and securing of the various parts is another. A loose wire if not attended to means damage, sooner or later, and a poor connection loss of power and possible burning. Some roads advocate the taking apart and thorough overhauling of motors and controllers once a month. This would seem to be somewhat oftener than is actually necessary, and it would be an extraordinarily severe service that would require it. The chance of doing damage to electrical apparatus while it is undergoing an overhauling is quite a factor and it would seem to be more reasonable to use judgment in this matter than to take the apparatus out and put it back at regular periods without regard to other conditions.

The question of maintenance naturally merges into the one of repairs, and it is difficult to tell where one leaves off and the other begins. The work of correcting and replacing the thousand and one little things constantly requiring it can only be realized by one who is fully experienced, and fortunate is the road that has efficiency and ability and thoroughness in this department. To say that a street railway company is known by the cars it keeps may be an odd adaptation of an old saying, but it is true, and the road that is thorough in this respect will not stop here, but will keep its other departments up to the same high standard, and its reward in nickels will be great.

*Read before the New York State Street Railway Convention, Niagara Falls, N. Y., September 15, 1897.

### A New Arc Lamp Hanger.

If the many various styles of arc lamp hangers that have, from time to time, been placed on the market were satisfactory in every respect, new styles would not so readily make their appearance. The "Dirigo" hanger, just being placed on the market by the well known firm, McGill & Pomeroy seems to cover thoroughly all the essential and desirable points that can reasonably be expected in a device of this kind. The cut needs little explanation. The insulating ball is made of the well known "Dirigo" insulation, and will stand a pressure of 5,000 volts without breaking down. Mechanically, the hanger is unusually strong, supporting easily a weight of 2,000 pounds. The above points, together with its handsome appearance and low price, will commend it at once to the wide-awake and careful station manager.

## ELECTRIC RAILWAY NOTES.

The electric street car line in Oshkosh, Wis., has finally purchased the horse car line and now controls the carrying business in that city.

The St. Paul, Minn., Street Railway Company has asked for permission to substitute electricity for cable power on its Fourth street line.

The Clodfelter Gas Belt Electric Railroad, of Anderson, Ind., under construction, will be sold at receiver's sale in November, it is reported.

The City Passenger Railway Company, of Baltimore, has secured right of way for a contemplated extension of its Hartford road electric line.

A syndicate of Baltimore capitalists has purchased the plant and franchises of the Columbia & Maryland Railway and will complete the line as an electrical railway.

The street railway company, of Cincinnati, Ohio, has abandoned the idea of placing funeral cars on the various lines. It was found to be impracticable and it was opposed by every undertaker in the city.

The St. Louis street car managers have combined against the law compelling them to equip their cars with vestibules to protect their motormen against the weather. They say it is unconstitutional, and they believe the courts will not sustain it.

The Torrington & Winchester, Ct., Street Railway Company, re-elected their old officers at the annual meeting held a few days ago. President, William B. Furguson, Boston; treasurer, Charles A. Richardson, Boston; secretary, Samuel A. Herman, Winsted; directors, William B. Ferguson, Charles A. Richardson and N. Sumner Myrick, Boston; Samuel A. Herman and Henry Gay, of Winsted; Edward H. Hotchkiss and F. F. Fuessenich, of Torrington.

The Princes Bay Railroad Company has been incorporated, to operate an electric street surface road one and one-half miles long, from the Staten Island railroad station, on Princes Bay, to the S. S. White Dental Manufacturing Company's factory, on the Princes Bay shore in Richmond County, N. Y. Capital, $15,000. Directors, Seymour Case and G. S. Barnes, of Tottenville; A. W. Browne, G. L. Harrison, C. L. Wincapaw, John A. Kennedy, H. G. Upson and W. A. Johnson, of Princes Bay, and A. W. Johnson, of New Brighton.

At the annual meeting of the Pittsfield, Mass., Electric Company the following officers were re-elected: President, Joseph Tucker; treasurer, C. E. Merrill; P. H. Dolan, manager; P. C. Dolan, superintendent; Joseph Tucker, C. E. Merrill, J. W. Hull, J. L. Bacon, P. H. Dolan and Alexander Kennedy, directors. The treasurer's report showed total receipts of $61,168; expenses, $48,047; depreciation, $17,000. The total number of passengers carried was 1,219,760. The assets are: Cost of Railways, $86,898; equipment, $20,041; land and buildings, $12,741; cash on hand, $2,528; total, $122,208. Capital stock, $60,000; funded debt, $45,000; total, $105,000.

## TWO AND ONE-HALF MILES OF ELECTRIC RAILWAY BUILT IN 22 HOURS.

(Concluded from page 228.)

in the country round about were on the scene, having been awakened by the glare of the lights. They were astonished beyond measure, and the majority of them would have gladly joined forces to aid in the construction of the road, as it was understood that the citizens of Bridgewater, Bound Brook and Somerville and the surrounding country are in favor of the New York & Philadelphia Traction Company, although at present the officials are in favor of the opposing company.

The grading went on marvelously fast, and the plowing teams went through the hard macadam as easily as if it had been soft earth; so rapidly was this part of the work pushed that by 10 o'clock Sunday morning all of the grading was completed.

Within an hour after beginning the work the track layers had started in, and so fast was the track laid that it was with the greatest difficulty that the 50 teams engaged for hauling rails, etc., could keep the gang supplied. Behind the track layers came the bonders, and as it had been planned to do no temporary work, the bonding was done in the most permanent and substantial manner, using short, flexible bonds under the angle plates of the 60 pound T rail.

The first men to begin work, however, were the linemen and pole setting gangs; the overhead construction was divided into sufficient gangs to enable the work to proceed simultaneously over all parts. It was also necessary to build a feeder line about 2,000 feet in length, connecting what had been a private isolated lighting plant with the railway line. So fast was the line work carried out that all the trolley brackets had been erected by eight o'clock Sunday morning, and at 10 o'clock the gangs began the stretching of the trolley wires. The trolley wires were readily run out by the use of the patent reel carts, with braking attachments, gotten up by J. G. White & Company. These carts also materially facilitated the erection of the feeder wires.

After all the men had been gotten to work and tools distributed and the first of the material delivered, it was necessary to locate the camps so that the head chef with his seven cooks could begin the preparations for breakfast, as it was a great certainty that the men would be good and hungry at break of day, although they had been well provided with sandwiches and coffee on board the train. The camp was located near the center along the line of road, about one mile from the location of the special train. This necessitated also the handling and hauling of the tents, stoves and cooking paraphernalia, with provisions. The location of the camps was specially selected on account of its proximity to a clear stream of water. It was not long before the steel ranges had been erected and fires built, but owing to the impossibility of getting coal, although the assurance had been given that this necessary article would be on hand, it was found necessary to resort to the railway ties to furnish fuel. While the cooks were preparing breakfast the helpers put up the tents, which consisted of a large wall tent for the commissary department and two large oval tents with center and side poles, about 50 by 100 feet, for the lodging of the men. Breakfast was served for the first relay of 200 at about seven o'clock, and when this relay was marched into camp the linemen were given a considerable scare, as they were convinced that the militia had been ordered out, as the large white numbers on the laborers' hats gave the appearance of helmets in the distance. It was found that the Italians had appetites fully three times that of an ordinary good eater, so that some delay was experienced in getting the Italians fed promptly. This delay was so aggravating to some of the line gang that they could not be induced to wait longer, and returned to their work without breakfast, which was sent to them later.

All construction moved along rapidly, with no protests, until about nine o'clock Sunday morning, when a man named Zeb Van Dorm, whose farm was on a line of the road, issued from his house with a gun, which he pointed at the 50 men who were completing the grading in front of his premises; they were southern negroes, to whom the sight of a gun carried no terror, and when the superintendent demanded Van Dorm to vacate he used a little argument, and it was with considerable difficulty that the negroes were restrained from taking action. Van Dorm very wisely withdrew and took his gun with him.

The construction went on rapidly, and all was serene until early in the afternoon, when the New Brunswick Traction Company had induced the County Commissioners of Bridgewater to make protest, and to go with the Sheriff and posse of deputies to the scene, arresting the foremen and others whom they could. Word was passed along the line and a messenger was dispatched for the attorney of the New York & Philadelphia Traction Company.

While this was progressing Superintendent Rudel, of the New Brunswick Traction Company, swooped down with a force of 100 Italians and attempted to tear up the tracks about the center of the construction. When the Baltimore negroes saw this they made a rush for the crossing, and so desperate was that rush, and so terrified were the Italians, that they fled in dismay, and they did not stop for fully three-quarters of a mile over the cross country. During this rush a pistol was fired, but it was not known by whom, and no damage was done.

On the arrival of Mr. Clark with Mr. John C. Shaw, a large property holder in the vicinity, the Sheriff had collared about 30 of the foremen, and on demand of Mr. Clark as to what authority he had for their arrest, and the Sheriff admitting that he had no warrant, the men were ordered to go to work, and the deputies and Sheriff did not attempt to restrain them. It was then a matter of intimidation, and the Sheriff rapidly appointed several hundred deputies, who placed themselves along the entire line of work; but the forces of J. G. White & Company were rapidly instructed to pay no heed to any orders except they be in the form of a written warrant, and consequently the work progressed and the arrests were nothing more than opera-bouffe. The law was not being violated, and the arrests were illegal. The cheers that greeted the Sheriff when the men were ordered to release themselves were terrific, and could have been heard for miles around. When it was found that no interference could be legally presented—although the intimidation went on constantly—the men took still more active interest in their work, and pushed on through the driving rain and storm of their own accord. Sunday night was a terrible night in Jersey, and the rain fell in torrents, the wind blew in blasts, and it was only by the aid of stimulants that the men passed through the ordeal, with nothing worse than lost voices. At six o'clock Sunday night the camp had assumed the air of military headquarters. Messengers were coming and going along all parts of the line; instructions were being received from headquarters to protect the property at all hazards, and to have the car running before 12 midnight. Arrangements had been made for bail and the payment of fines had many arrests been made; but this was found unnecessary, as the men were careful not to be party to the first assault, and it is gratifying to know that during all the excitement not a blow was given, as the opposing forces knew full well the results had they attempted to use violence. About 10 o'clock Sunday night a large force of Italians of the opposing company was taken up the line for supposed attack. Messengers quickly brought word to the camp, and it was with difficulty that the whole body could be restrained from following the defense. Fifty men were selected to defend the property. They marched to the trolley car, which had been placed upon the track, and which was receiving final adjustments ready for the turning on of the current. At the appearance of the protecting forces the attacking party withdrew, and nothing further was heard from them.

Complete secrecy was necessary in obtaining and transporting the trolley car, which was successfully carried out. The arrangement for power happened to be a very good one, and was unique. The large hotel property of Mr. John C. Shaw, a prominent New York lawyer, located near Finderne, was used as a power station. This property was equipped with a small isolated plant which had not been in operation for two years; when the rush construction was decided upon it was found that the boiler would have to be tested, and the engine overhauled. The lighting generator was not suitable, so a railway generator had to be provided, and as it was extremely important that the question of power be absolutely certain, it was thought best to have this plant installed. These changes were made to the plant, and it was put in operation before the eventful Sunday. This was successfully accomplished under the ruse of reopening the hotel, and a new generator was hauled by horses a distance of about 60 miles.

Everything had been so successfully planned and carried out that at 11 o'clock the trolley wires were up and a track opened for the operation of the car. The current was turned on, and amid the greatest of cheers the cars were taken over the line, accompanied by a guard, as it was expected an attack would probably be made on the car. This held the franchise, and the contract was carried out and the car put in operation in 22 hours from the time of beginning the work.

The route for the entire distance lies along the side of the macadamized country road, and required at one place the planning and providing of 100 feet of timber trestling as approaches to a bridge. This was carried on a special train from Baltimore.

The New York & Philadelphia Traction Company are to be congratulated on making their contract with J. G. White & Company, who are also to be congratulated for the successful manner in which the same was carried out. Great credit is due Mr. John Blair McAfee, of the New York & Philadelphia Traction Company, who has shown the greatest executive ability in carrying out his part of the arrangements for the work, and also to Mr. C. G. Young, of J. G. White & Company, who planned the work and made all the detailed arrangements, and to Mr. John A. Wilson, of J. G. White & Company, who superintended the construction of the work.

### Three Accidents.

Henry Lawlor, an oiler employed by the Mount Morris Electric Light Company, of New York city, was killed by electricity early one morning last week. Some of his fellow workmen found him dead in the dynamo room, with burns on his face, right arm and back. How he came in contact with the current is unknown.

Thomas Daly, an employé of the Edison Electric Illuminating Company, of New York, was killed last Wednesday by having his coat caught on a revolving shaft. Before he could save himself he was whirling around at a very high rate of speed, and every bone in his body was broken. He died after being removed to the Hudson Street Hospital.

Three workmen on the new electric road from Victor to Cripple Creek, Colo., were killed on November 2 by the premature explosion of a blast. The roadbed for the new trolley line was being graded down the side of a mountain near the city of Victor, and a blast was being prepared. A man working with a drill struck a spark from the rock and ignited the powder in the blast. Three other men were hurt.

## DISCIPLINE OF EMPLOYES.*

BY GEORGE H. DAVIS.

Discipline is universally recognized as a necessity in every important industrial undertaking. It is as thoroughly essential to success and operation of railways as are the plans and specifications in their construction. In the broad sense, it means the government of operatives through whom the equipment is made to do its work, and the efficiency of the equipment varies in direct ratio with the efficiency of its operatives. A road has good discipline when all employés respect and kindly regard each other; when the officers do their best for the men, and *vice versa;* and when both officers and men sacrifice everything to the interests of the company. It is a somewhat difficult task to maintain the conditions as defined, but the nearer this standard is approached the greater the surplus earnings. Discipline should never be interpreted in the narrow sense that a man is to work as a machine. It is true that "cars should run like clockwork," but, to arrive at this result through the constantly changing circumstances that arise, requires the services of men of thorough training, presence of mind and good judgment.

There is no fixed method of maintaining good discipline. It is frequently the result of the natural personal characteristics of the man in charge. There are, however, certain principles which are probably of universal application. First of all, a railway manager must gain the implicit confidence of his officers and men. To do this he must, in general, know the details of the design, construction, operation and maintenance of railways. He must have a universal reputation among his men of being shrewd, vigilant, industrious, honest and perfectly fair in his dealings. He must know them all personally, stand by them, and respect them as gentlemen upon all occasions. He must be thoroughly popular, and able to create among them a spirit of loyalty and enthusiasm in regard to the road and its interests. A thing of greatest assistance in discipline is complete organization. Every man engaged in railway operation, from president to track-greaser, should have before him, in printed form, a full synopsis outlining all the essential features, the exact limit, scope and character of service that he is to render. All officers should have their exact relative rank in the service, which should be thoroughly known among all employés. In this way, if conflicting oral orders are given, the order given by the officer of superior rank will be obeyed without question.

Another feature of discipline is the issuance of orders. Many failures to obey orders are due to a misunderstanding or misinterpretation. It is therefore important in railway operation to issue all orders in printed form, clearly and definitely stated. These orders should be sent in explanatory personal letters to all superintendents, foremen, inspectors and starters, and be published on conspicuous bulletin boards at all stations. An order should never be issued except that it meets with the approval of the best officers and men, and after once issued, it should be an infallible law, applicable to all employés alike, and if broken, it should in all cases be followed by a prompt, severe penalty. Satisfactory discipline can not be maintained unless employés in all ranks are worked to their full natural capacity and physical strength. Idleness and easy positions in railway operation will undermine the best system of government that could be established. Again, constant watching is a most important factor. The general manager, or whoever is responsible for the receipts, expenses, maintenance and discipline, should spend at least eight hours a day directly on the lines of the company. There should be trusted starters at both ends of all lines at all times, and at least one inspector for each 30 cars operated.

Written reports for the smallest details of both good and bad features of the service should be insisted upon from all officers of the company, and a false report or statement from any employé should be sufficient cause for his instantaneous discharge. Nothing good or bad in a man's service should be passed without the manager's recognition. One of the strongest incentives to good work among men who are trying to do their best, is praise. When a motorman saves a pedestrian from mutilation or death from an electric car, his act should be recognized by a complimentary personal letter, thanking him for his skillful work. In general, a manager should have only praise for his officers and among the men 90 per cent of them should be above censure. However, when a man is censured it should be severe and the final preliminary to his discharge. A man should never be discharged except his case is given a thorough investigation, and he is given abundant opportunity for defense. When he is once discharged he should never be reinstated. Railway employés, as a rule, admire a policy which is open, fair and generous. When an unusually large day's work is done in handling a great crowd of passengers, it is no more than fair for the company to share its profits with the men in giving them a few hours' extra time, the number of hours being in proportion to the extra receipts. The amount of money thus invested will, in the future, return to the coffers of the company a hundredfold and more. Perfect management is something beyond human effort, still, if the problem is earnestly and industriously studied, railways may be operated to the complete satisfaction of the public, the stockholders and the employés.

As a partial solution of the different questions arising in connection with discipline, a competitive civil service system is offered as a suggestion. There are no new principles in this system as commonly understood. It is only a way of carrying out what every successful man has always followed in his business career. He selects the man whom he believes most efficient. He promotes the man who is of the greatest service to him, and discharges the man whose services are of the least value. All civil service methods employed by the government take account only of a man's ability in successfully passing the initial competitive examination. In reality a man's work in the service after employment should have far greater weight in regard to his retention or promotion than the mere fact that he was able to answer correctly a series of questions, at best having only an auxiliary connection with the work to be performed. Another serious weakness in municipal or government civil service methods is that often questions are prepared and answers examined by commissioners who know nothing of the business, trade or profession for which they are conducting the examination. In all cases questions should be prepared and examinations conducted by the head of the department under whom the candidate is to work after entering the service. To insure perfect fairness, commissioners may be delegated to criticise the questions, witness the examinations and judge of the relative merits of all answers. Any successful competitive civil service system for railways must take into account: 1. The previous history of the applicant, including his railway experience. 2. His knowledge and skill in railway operation, which is covered by competitive examination. 3. His physical condition. 4. The quality of his work after entering the service.

The quality of his work after entering the service is the best criterion by which to judge of his relative value. However, before a man is employed it is impossible to judge of his work, and the only alternative is a broad, practical, competitive examination, which covers a sample of his work under the observation of the examiner, together with answers to the most practical questions that may be framed. In applying these methods to railway operation and maintenance, it is necessary, so far as practicable, to classify the positions of each of the various departments, so that there is a fixed line of promotion from the lowest to the highest rank. This does not mean that a man shall have worked in all ranks of a given branch of the service, or even in all branches of a given department. It does mean, however, that he shall have started at the lowest round of the ladder in some one branch, and have learned some one department to perfection, and all departments in general. Railway companies vary widely in their classification of positions and the relative importance which they attach to the services of each department. It is not intended at this point to discuss the organization of railway operatives. A classification, so far as civil service methods are concerned, may be compared to a river and its tributaries, where the waters of all branches, if they are not evaporated, may reach the desired terminal. In short, it is a question of all being given an opportunity, and the survival of the fittest.

There are, apparently, some difficult features in the general policy of promoting men according to their relative standing from one department to another, or even from one branch to another of the same department. The skill and experience required in one may be totally different from that required in another, and again a man may show marked ability in one position, while in another he would prove most inefficient. However, if a man is industrious, bright and faithful in one position he will maintain the same characteristics in another, and, as every practical man knows, these qualities of character in an employé are more desirable than all others. A competitive civil service system, if correctly applied, is a most advantageous solution of the question of advancement of employés, and does not interfere with a practical line of promotion. For example, if a vacancy occurs at the head of a given department, all employés ranking highest in the various branches are eligible to compete for the position. In deciding upon the successful candidate, two things should be taken into consideration—the previous standing and record of the competitors with the company, and the result of their competitive examination.

In all departments of the Canal & Claiborne Railroad Company employés are placed upon a basis of competition. Men are employed who have the best standing according to a broad competitive examination, and are placed in the lowest rank of any given branch of the service. Promotions in the various branches, so far as practicable, are made consecutively from one rank to another. The company fills every position from among its own employés, provided there is any one in the service competent to take the place. To illustrate, if the position of chief dispatcher were vacant, all starters employed by the company would be eligible to compete for the position. The chief dispatcher prepares all schedules, knows the exact position of every car on the road and the crew that is operating it. Now, if, upon competitive examination, it was found that no starter employed by the company was able to prepare a thoroughly practical, satisfactory and economical schedule, then no one in the direct line of promotion would be given the position. In this case another examination would be held, in which the employés of all departments would be eligible, together with the employés of other companies or outside persons. In this way, merit alone is recognized as a basis for advancement, and also the highest standard of efficiency is maintained in the various positions. So far as practicable, the same regulations apply to the transportation department, the maintenance department and the accounting department. In the transportation department, in the employment of motormen and conductors, when an applicant presents himself, if he is worthy of consideration after a preliminary conversation and inspection, he is given application and recommendation blanks. To be eligible for appointment as motorman or conductor, the applicant must be between the ages of 25 and 40; for the position of motorman he must weigh at least 160 pounds, and not exceed 210 pounds, and must be at least five feet eight inches in height; he must have had at least one year's experience in the position he seeks, and should be recommended to the service by at least three officers of the company, including foremen, inspectors and starters, and also by at least seven motormen and conductors, who are already in the service. He then obtains the company's physician's certificate with regard to his physical condition. If his certificate, application and recommendations fill the requirements and are apparently satisfactory, they are then given to an inspector, who personally investigates his previous record among the employés with whom he has worked, and also among outside persons who know the applicant. If the inspector's report of investigation is satisfactory, the applicant is placed on the lines of the company with motormen and conductors who have the best standing in the service. He rides with these men until he is familiar with the special features of the lines of the company. He is then given the competitive examination. This is intended to be extremely practical, and consists of two parts: 1. The applicant takes charge of a car with an inspector, who estimates the quality of his work for one trip over each line of the road. 2. He answers a list of questions covering the various things connected with this department of railway service. Finally, the applicant presents himself at the office of the general manager, where he is questioned in regard to all orders and instructions previously issued by the company and his understanding of the conditions under which he will be expected to work.

*(To be concluded.)*

* Read before the American Street Railway Association, Niagara Falls, N. Y., October 22, 1897.

## ADVANCE INFORMATION

### New Electric Railways.

CHATTANOOGA, TENN.—The Chattanooga & Lookout Mountain Railroad Company has just been organized for the purpose of building and operating an electric railroad on the top of Lookout Mountain. The line will extend from the Point Park, just above the Hooker battlefield and National Reservation, to Lula Lake, a distance of seven miles. President Crass states that the road will be completed as rapidly as possible. The road and equipment is to cost $100,000.

NASHUA, N. H.—Work on the extension of the electric road from North Chelmsford to Tyngsboro bridge has begun.

WATERFORD, MICH.—A franchise has been granted for an electric road to pass through the village. Pontiac capitalists are interested in the proposed road.

GOODRICH, MICH. — The Flint–Pontiac electric road has been granted a franchise.

YOUNGSTOWN, OHIO—All the preliminary arrangements have been made whereby a trolley line is to be run from this city to Struthers, five miles southeast. A. Anderson and John E. McVey, of the Mahoning Valley line, are behind the scheme. The capital stock of the company will be $75,000.

BRADFORD, N. Y. — The charter for the electric railroad through this place has been granted, and active operations will begin soon. J. D. Nares is interested.

WAYNE, MICH.—Vincent A. Taylor, of Cleveland, has been granted franchise to construct an electric railroad through Wayne.

PITTSFIELD, MASS. — An electric railway will be built between Pittsfield and Albany.

WILMINGTON, DEL. — The Newport, Newcastle & Wilmington Railway Company has completed its organization, and will construct a trolley line from Newport to Wilmington, Del., via New Castle, Pa.

CONCORD, N. H. — Parties from Brooklyn, N. Y., contemplate the erection of an electric railroad in this city, if a charter can be secured. The line will run from East Rochester to Gonic.

### Electric Light and Power.

BELLE CENTER, OHIO—The Town Council has granted the Belle Center Electric Company a franchise for lighting the town.

THOMASTON, GA. — Dr. G. W. T. Hannah and others will build an electric light plant.

PENN YAN, N. Y. — The Penn Yan Electric Light Company is negotiating for a 1,000-light incandescent dynamo, which will be located in Russell & Birkett's flour mill

DUNKIRK, N. Y.—The electric light plant at this place is to be improved.

GLADSTONE, MICH.—This town has closed a contract for the erection of an electric lighting plant.

GRAND RAPIDS, MICH.—City Clerk may be addressed concerning $125,000 worth of bonds to be issued to build a municipal electric lighting plant.

CHICAGO, ILL.—Mayor Harrison may give information concerning extension of city electric light plant, for which $150,000 appropriation has been ordered.

OCALA, FLA.—City Clerk may give information concerning electric light plant.

QUINCY, FLA.—Wm. M. Corry may be addressed concerning contemplated erection of electric light plant.

ATLANTA, GA.—Alderman Joseph Hirsch may give information concerning electric light plant.

PORT HURON, MICH.—The establishment of a municipal electric lighting plant is again being agitated in this city, and the question will be submitted to the voters at the coming city election.

MINETTO, N. Y.—Electric lights are to be established at this place.

MILWAUKEE, WIS.—The contract for the construction of the electric light plant and conduits in the public building has been awarded to the Western Electric Company, of Chicago.

BALDWINVILLE, MASS. — It is understood that Smith, Day & Company are to place an electric plant in their factory.

NORTHAMPTON, MASS.—The gas company is making preparations to light the Clarke Library and City Hall with Welsbach burners. In the library they will raise the candlepower from 352 to 900.

ORANGEVILLE, ONT.—Wm. Wallace, chairman street lighting committee, can give information concerning lighting of the streets with electricity.

WATERLOO, ILL. — Joseph W. Drury, chairman waterworks and electric light committee, can give information concerning lighting of streets with electricity.

SALISBURY, N. C.—C. N. McAdoo, of Greensboro, N. C., has made a proposition for the establishment of an electric lighting plant in Salisbury.

GOLDSBORO, N. C.—Electric lights and waterworks are to be put in the Odd Fellows' Orphan Home.

BENSON, MINN.—R. R. Johnson has been granted a franchise for an electric light plant, and the plant will be in operation by the middle of November.

LAKE GENEVA, WIS.—The Electric Light Company has been incorporated with a capital stock of $9,000.

GREENWOOD, S. C.—The commissioners may be addressed concerning construction of electric light plant.

DOUGLASVILLE, GA.—Steps are being taken looking to the erection of an electric light plant.

JACKSONVILLE, FLA.—The Mayor may be addressed concerning erection of electric light plant.

NIAGARA FALLS, N. Y.—S. F. Arkush, City Clerk, can give information concerning electric light plant.

DELPHOS, OHIO—City Clerk may be addressed concerning proposed erection of electric light plant.

### New Telephone and Telegraph Companies.

LOUISA, KY.—The telephone line from this place to Catlettsburg is now completed.

VALPARAISO, IND.—The Harrison Telephone Company, of Lafayette, last week completed their line to this city, and now connection with 62 towns in the state, as far south as Indianapolis and Crawfordsville, has been made. The management announces that the line will be extended all through northern Indiana.

PONTIAC, MICH.—The New State Telephone Company, of this city, has its exchange nearly fitted up. About 125 'phones have been placed here, and the company expects to begin business some time next week.

LEIGHTON, ALA.—Paul S. King is working for a telephone line from Leighton to connect at Tuscumbia, Sheffield and Florence.

HYATTSVILLE, MD.—W. C. Lord may give information concerning formation of company to construct telephone system.

NASHVILLE, TENN.—The Southern Telephone Company will establish a telephone system and exchange of 3,000.

HARTLAND, N. B.—The long-distance telephone is now complete between Woodstock and St. John. This gives the following places north of Woodstock a chance to talk with Winterport, Newburg, Hartland, Victoria Corner, Florenceville and Centreville.

ERIE, PA.—The Mutual Telephone Company will open its lines to subscribers in a few days.

COLUMBIA, MO.—J. A. Johnson will begin in a few days the construction of a telephone line between Columbia and Centralia. When this is finished the line will be extended to St. Louis and Kansas City.

ELY, NEV.—The telephone line between this place and Eureka is completed.

STURGIS, S. D.—The Black Hills Telephone Company has recently put in an exchange in this place, and has 15 subscribers.

### New Manufacturing Companies.

DETROIT, MICH.—The American Reminder Company has been incorporated for the manufacture, sale and leasing of "special clocks and electrical apparatus." The capital stock is $10,000. The stockholders are: John T. Holmes, George A. Beaton and Herschel H. Hatch.

CHARLOTTE, N. C.—The Electrical Engineering and Supply Company has been incorporated by Dr. I. W. Faison, David S. Yates and Samuel J. Smith, to sell and construct electrical plants, design same, etc. Capital stock, $5,000.

BROOKLYN, N. Y. — James M. Mason Company has been incorporated to manufacture electrical appliances. Capital stock, $50.000. Directors, John W. Morrison, James W. Mason and Samuel H. Frazer, of Brooklyn.

WASHINGTON, D. C.—The Washington Electrical and Manufacturing Company has been incorporated, with H. P. Hill as president and John S. Beach, local agent, Alexandria. Capital stock, $10,000.

NEW YORK, N. Y.—The Standard Steam Specialty Company has been incorporated to manufacture steam and electrical specialties. Capital stock, $5,000. Directors, Herbert A. Joslin, William H. Long and Elbert Crandall, of New York city.

### Jersey Trolley Cars Must Have Vestibules.

The police of Jersey City, N. J., busied themselves last week in getting the numbers of trolley cars which were run on the lines of the Consolidated Traction Company and the North Hudson County Railway Company without vestibules at either end, as required by law. The number of one car on each line and the name and address of the conductor were taken. Corporation Attorney Douglas will at once begin suit to recover the prescribed penalty, $50 for each car. If judgment is given against the companies, the case will be taken to the Supreme Court for a review on a writ of certiorari and the constitutionality of the law tested. Spencer Weart, counsel for the Consolidated Traction Company, was quoted as saying:

"We want to know if the law is constitutional, and what kind of a vestibule is meant before we equip our cars. The law is vague and an interpretation is necessary. The company is not seeking to evade the law, but we would like to know what the law really means before we are put to a great expense."

### Municipal Electric Light Plant for Dunkirk, N. Y.

The Water Board of Dunkirk, N. Y., on November 4 acquiesced in the request of the Common Council to immediately purchase a dynamo for furnishing incandescent light for the public buildings of the city. The incandescent light system will be owned by the city and operated by the Water Board in connection with the water supply and the municipal street arc lighting. The secretary reported sufficient money in the treasury to meet the expense. It was also mentioned in the board meeting that after supplying light to the public buildings the surplus power may be used in extending the service to private consumers. The electric light superintendent reports that the expense of each street arc light per hour in October was 2.2 cents.

# Kindred.... ...Interests

**The successors** to the Metropolitan Electric Company, of Chicago, have on hand a very large line of porcelain white tubes, as well as clay tubes in all sizes, which they are furnishing to the trade at bargains.

**McKenney & Waterbury,** 181 Franklin street, Boston, Mass., manufacturers of gas, oil and electric fixtures, report that during October they took more large contracts than ever before in the history of their business.

**The Standard Thermometer and Electric Company,** of Peabody, Mass., has perfected an inclosed alternating arc lamp operated direct from a secondary circuit of from 100 to 125 volts without the need of special transformers.

**The Monarch engine stop** is fully illustrated and described in a handsome catalogue sent out by the Monarch Manufacturing Company, Waterbury, Ct. The Monarch engine stop and automatic speed limit is a device which merits the attention and investigation of every user of steam engines. Catalogues are sent free on request.

**The factories** of the Bernstein Electric Company, of Boston, show every indication of great activity in the production of the standard makes of the Bernstein incandescent lamps. The aim of this company has always been to make the most perfect lamp money and skilled labor could produce, in contrast with the opposite theory that cheapness was the great requisite.

**The Westinghouse Electric and Manufacturing Company** has sent out two new catalogues, one describing switches for alternating and direct currents not exceeding 600 volts, and the other describing automatic circuit breakers for direct-current circuits not exceeding 750 volts. These catalogues may be obtained from the main office or from any branch office of the company.

**The Lombard Water-Wheel Governor Company,** of Boston, have made wonderful progress during the past few months in the installation of the "Lombard" governor. The chief engineer of the company is now in the West superintending the construction of a number of equipments, and only recently an order for 11, to be located in Wisconsin, has been received by the company.

**The switches and cut-outs** made by the Newton Appliance Company, 120 Liberty street, New York city, are used in the new Astoria Hotel, which had its christening last week by the "Four Hundred" of New York. This is an excellent indorsement, as the aim of the builders and contractors for the electrical features of this hotel—which is a city in itself—has been to make it the most perfect in the world, and every detail has been scrutinized.

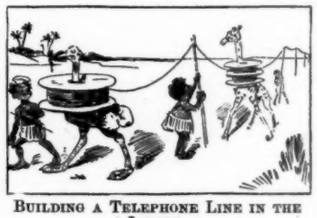
**The Electric Appliance Company,** Chicago, report that they are rapidly reaping the benefits of the complete distribution of their new issue of general catalogue No. 12, and that it is resulting in a very large increase in their business and the opening up of a great many new and desirable accounts. The Electric Appliance Company are certainly entitled to reap their reward, as the catalogue issued is a very elaborate one, and has been published and distributed only at a very great expense.

**Owing to the unexpected increase** in volume of the inclosed arc lamp business, and in view of greater convenience to their customers, the General Incandescent Arc Light Company have decided to open a downtown office in New York, instead of handling business entirely from their factory, as heretofore. They have accordingly established headquarters in Room 602, Bowling Green Building, 11 Broadway, and have placed in charge Mr. Fred E. Dolbier, as manager of the arc lamp sales department, to which office all orders and inquiries for arc lamps should be sent.

**In connection** with the inclosed arc lamp being introduced by the Helios Electric Company, of Philadelphia, they make the remark that the amount of impurity in a 12-inch carbon does not change with the length of time it can be made to burn, and that there is no difference in the amount of impurity on cylinder walls when a 12-inch carbon burns 80 to 100 hours and when the same 12 inches of carbon burn from 150 to 200 hours. The Helios company say their lamp burns 150 to 200 hours with one trimming, thus effecting an economy of about 100 per cent in carbon consumption and attendnce.

**The Lynn Incandescent Lamp Company** have established at Lynn, Mass., as is well known to many readers of the ELECTRICAL REVIEW, a factory for redeeming worn-out incandescent lamps. The processes used in this work have been developed by years of labor on the part of President Dwyer, of this company, until the work is now recognized as a legitimate feature in the lighting field, so much so that the shops of the company are operating to the fullest capacity at the present time. The renewed lamp involves the taking out of the old filament, which is replaced by a new one, and the lamp is then resealed and subjected to the vacuum pumps. To one who knows the peculiarities of constructing the delicate incandescent lamp, the difficulties for the successful accomplishment of this are appreciated.

**The Newport News Ship-building and Dry Dock Company,** of Newport News, Va., are erecting, at their ship yard, a crane capable of lifting 140 tons. This crane is to be used for the placing of engines, boilers and other machinery in the large war vessels which they are constructing for the government, and will be also used for placing on the sides of these vessels their armor plates, some single pieces of which weigh from 40 to 50 tons. The crane will have sufficient reach so that it will cover the entire width of a large cruiser. This crane revolves in a circle on a turn-table, which is supported on a steel foundation about 25 feet high. This steel foundation is to carry, besides its own weight, the weight of the crane, its machinery, and whatever load may be lifted, which, altogether will aggregate 900 tons. The steel support for this crane is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Ct.



BUILDING A TELEPHONE LINE IN THE JUNGLE.


STORAGE BATTERIES
THE WILLARD BATTERY CO, CLEVELAND, O.

A. L. BOGART CO.
SUCCESSORS TO A. L. BOGART,
ELECTRIC GAS-LIGHTING SPECIALTIES
50 East 20th Street, NEW YORK.

J. G. WHITE & COMPANY,
Incorporated,
ENGINEERS, CONTRACTORS.
Successors to White-Crosby Company, and J. G. White & Co.,
29 BROADWAY, NEW YORK, N. Y.
Baltimore Office, Equitable Building.

RUBBER COVERED
WIRES AND CABLES
FOR EVERY SERVICE.

For Underground, Aerial and Submarine use, "Safety" wires and cables have the indorsement of some of the largest users in the United States. Write for our booklet containing the experience of users.

THE SAFETY INSULATED WIRE & CABLE CO.,
225 to 239 West 28th Street, New York.
LEONARD F. REQUA, General Manager.

Good Telephone Books.

"PRACTICAL INFORMATION FOR TELEPHONISTS,"
BY THOMAS D. LOCKWOOD.
The Telephone Man's Text Book.
192 Pages. Price, $1.00.

"TELEPHONES, THEIR CONSTRUCTION AND FITTING,"
BY F. C. ALLSOP.
Description of Receivers, Transmitters, Switch Boards, Complete Instrument Switches and Switch Boards, Erecting Telephone Lines, Overhead Wires, Instruments, Connecting, Testing for and removing faults.
256 Pages. Illustrated. Price, $2.00.

"TELEPHONE LINES AND THEIR PROPERTIES,"
BY W. J. HOPKINS.
Contents: Design and Construction of City Lines.
Underground Work.
Long Distance Lines.
Wire, Insulators, Exchanges, Switch Boards.
The Propagation of Energy.
The Telephone Current.
Measurement.
Properties of City Lines, Cables, Etc.
Price, $1.50.

"MANUAL OF TELEPHONY,"
BY W. H. PREECE AND ARTHUR T. STUBBS.
Price, $5.50.

"ELECTRIC TELEPHONY,"
BY E. J. HOUSTON AND A. E. KENNELLY.
New. Price, $1.00.

"HOW TO MAKE AND USE THE TELEPHONE,"
BY GEO. H. CARY.
The purpose for which this book is written is to furnish information to those who may desire to construct or use telephones, telephonic apparatus or lines on a small scale.
Price, $1.00.

"TELEPHONE TROUBLES AND HOW TO FIND THEM."
BY C. R. HASKINS.
A practical little treatise for telephone inspectors, exchange managers, and employés who are not electrical experts, as well as the general public, who use telephones or private lines.
Price, 25c.

"THE TELEPHONING OF GREAT CITIES,"
BY A. R. BENNETT.
Price, 50 Cts.

"THE PRACTICAL TELEPHONE HAND BOOK,"
BY J. POOLE.
Price, $1.00.
A thoroughly practical manual of moderate size and cost, describing the latest development of the subject.

"TELEPHONE HAND BOOK,"
BY H. L. WEBB.
Price, $1.00.

Copies of above books sent to any address on receipt of price.
ELECTRICAL REVIEW PUBLISHING CO.,
41 Park Row. NEW YORK.

THE
HUDSON IRON COMPANY.

Manufacturing Site for Sale.....

85 ACRES OF LAND—1,100 FEET TIDE WATER FRONT, 400 FEET DOCKED.
2 SLIPS, EACH 250 FEET DEEP.
TWO R. R. LINES.

The undersigned, permanent Receiver of the Hudson Iron Company, at Hudson, N. Y., offers for sale property as outlined above, in block or parcels to suit purchaser.

The docks are accessible to any vessel that can enter the harbor of New York.

Tracks of the N. Y. C. & H. R. R. R, and Boston & Albany R. R. run through the property.

Commodious office building and Fairbanks track scale of 50 tons capacity.

Shipping facilities by rail and water in all directions.

For manufacturing purposes, this property is unsurpassed by any on the Hudson River.

Shops of The Steel Tired Wheel Company, now in process of enlargement, adjoin the premises.

The Hudson Iron Company conducted business on this site for about 48 years, paying an average annual dividend of 12 per cent. The proceedings for its dissolution were voluntary, the company being entirely solvent, and the limit of its corporate life having been nearly reached.

FRANK H. STOTT,
Permanent Receiver Hudson Iron Co.
STOTTVILLE, N. Y.

J. RIDER CADY,
Counsel for Receiver,
10 So. FOURTH ST., HUDSON, N. Y.

# Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED NOVEMBER 2, 1897.

592,760 Galvanic battery; H. J. Brewer, New York, N. Y.—The combination of a battery cover having a cup formed thereon, with a battery element passing into said cup and supported therein, and an elastic connection interposed between the head of the cup and the battery element.

592,765 Pneumatic dispatch tube; T. A. Casey, New York, N. Y.

592,769 Method of and apparatus for relaying telephonic messages; A. W. Erdman, Milburn, N. J.—An improvement in the art of electrically transmitting speech, which consists in transferring the sonorous electrical vibrations of one telephonic circuit to another, through the intermediation of a current of air whose rate of flow and pressure is controlled by the transmitting circuit, and controls the receiving circuit.

592,782 Chemical-electric generator; H. K. Hess, Syracuse, N. Y.

592,788 Rotary motor; V. Karavodin, St. Petersburg, Russia.—In a thermic motor, the combination of a cylinder, a piston rotating therein, provided with continuous grooves in its ends, and suitable passages for a liquid lubricant extending from the exterior of the cylinder into the piston, and from the interior of the piston to said grooves, and to the portions of the surface adapted to move in approximate contact with the peripheral walls of the cylinder.

592,805 Electric light fixtures; F. B. Mason, Brooklyn, N. Y.

592,815 Electric conductor and connection and support therefor; Wm. McElroy, Brooklyn, N. Y.

592,831 Electric railway system; Wm. Robinson, Boston, Mass.

592,844 Apparatus for electrically treating diseases; H. E. Waite, New York, N. Y.—In an apparatus for treating diseases, the combination with an air impulse device, of an electric impulse device arranged so that the air and electrical impulses shall be simultaneous.

592,853 Electric battery; A. E. Wheeler, Hyde Park, Mass. In an electric battery, a cover consisting of two plates, each having elongated openings extending inward from one end, and placed one upon the other, with their openings extending in opposite ways.

592,878 Dental electrode; F. L. Morhard, New York, N. Y.—In a dental electrode, the combination, with a conductor having a pocket to hold the anesthetic of a non-conducting shank adapted for contact with the opposite jaw or tooth.

592,889 Distributing board for electric currents; H. W. Shonnard, New York, N. Y.

592,917 Magnet armature; H. M. Paine, Amherst, Mass.—An armature in sections or separate parts in combination with a lap joining the sections.

592,928 Trolley for electric cars; E. C. Davis, New York, N. Y.

592,951 Regulating socket for electric lamps; C. A. Chute, East Liverpool, Ohio.

592,954 Signaling apparatus; P. A. Hubert, New York, N. Y.

592,962 Electric signal apparatus; F. W. Cole, Newton, Mass.—The combination with an electric circuit, code signal and telephonic transmitters therein, for sending two different classes of signals over said circuit; viz., code signals and telephonic messages, code signal and telephonic receivers responsive, respectively, to said transmitters, and automatic switches for said telephonic transmitters operated by any one of said code signal transmitters in the circuit.

592,965 Electric motor for street cars; C. E. Emery, Brooklyn, N. Y.

592,973 Electrolytic apparatus; E. Motz, Brewer Mine, S. C.—In an electrolytic apparatus the combination with a trough or sluice of a series of curved communicating passages, each passage being tapered from its outlet to its inlet end, and the opposing walls of each passage being formed by cathode and anode plates, respectively.

593,050 Alternating-current regulator; D. O. Hull, Clyde, Ohio.

593,051 Electric railway; R. M. Hunter, Philadelphia, Pa.—In an electric railway a slotted conduit in combination with insulated supports upon its interior, and one or more loose conductors therein and capable of being drawn through the slot.

593,138 Electrical transformer; Nikola Tesla, New York, N. Y.—A transformer for developing or converting currents of high potential, comprising a primary and secondary coil, one terminal of the secondary being electrically connected with the primary and with earth when the transformer is in use.

593,143 Electric railway system; H. P. Wellman, Ashland, Ky.

593,154 Current collector for electrical railways; F. A. Anderson, Washington, D. C.

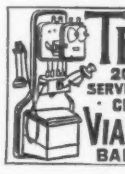
593,167 Electro-magnetic circuit-breaker; D. C. Spruance, Philadelphia, Pa.—The method of opening an electric circuit, which consists in mechanically breaking out by a hammer blow a section of the circuit from between two terminals, and simultaneously breaking the removed section into plurality of parts.

593,172 Carbon-holder for arc lights; C. C. Bailey, Woonsocket, R. I.

The directors of the New England Telephone and Telegraph Company have declared a regular quarterly dividend of $1.50, payable November 15.


**Do You Want Gold?**

Every one desires to keep informed on Yukon, the Klondike and Alaskan gold fields. Send 10 cents for large compendium of vast information and big color map to Hamilton Publishing Company, Indianapolis, Ind.



THIS CO HAS BEEN MAKING
TELEPHONES
20 YEARS, NOT CHEAP BUT SERVICEABLE AND FULLY GUARANTEED.
CIRCULARS FURNISHED.
VIADUCT ELECTRIC Co.
BALTIMORE, MD., U. S. A.

IMPROVED AND NOW PERFECT.
THE "ESPERSEN ADJUSTABLE SHADE LAMPS."
Made in ten different styles and colors to suit purchaser. Write for Discounts and Catalogue "D." Good Agents wanted in the U. S. and Europe.
PACIFIC ELECTRIC CO.,
120 Main Street, La Crosse, Wis.

ROYCE & MAREAN,
*DEALERS IN*
Electrical Supplies
WASHINGTON, D. C.

JUST ISSUED.
No. 9 CATALOGUE,
304 pages. Sent on receipt of 10 cts. To the Trade, Free.
No. 5 PAMPHLET,
100 pages. Contains full line of **Bicycle, Photographic** and **Electrical Novelties,** free upon application.
MANHATTAN ELECTRICAL SUPPLY COMPANY,
32 Cortlandt Street, New York.

MANHATTAN PRODUCTS

BO PEEP B, 4x5 $15.
CAMERAS
DANDY,
BO PEEP, A B C,
BABY WIZARD,
WIDE-ANGLE WIZARD.
LENSES: "Daisy," Achromatic, "Emil," Wide-Angle, Extreme Wide-Angle, Rapid Rectilinear, Extra Rapid Rectilinear, "Wizard," Double Anastigmat.
Try our developing and toning powders; full line of chemicals for the amateur. Sundries of every description.
MANHATTAN OPTICAL CO., of N. Y.
WORKS AND EXECUTIVE OFFICES,
CRESSKILL, N. J.

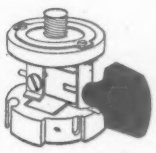
TREASURY DEPARTMENT, WASHINGTON, D. C., October 23, 1897.—Sealed proposals will be received at this Department until 2 o'clock P. M., November 30, 1897, for installing an electric light and power plant in the Post Office Building, Washington, D. C. Proposals will be received as follows: 1. For tubing and wiring the building. 2. For dynamos and engines. 3. For the plant complete. Proposals must be accompanied by certified checks, drawn to the order of the Treasurer United States, as a guarantee of good faith. The amount of the checks, together with other requirements relating thereto, is fully set forth in the specifications of the Department. The right to reject any and all bids, and to waive defective bids, is reserved by the Department. Specifications and plans can be obtained upon application to the Chief Clerk, Treasury Department. Proposals should be addressed to the Secretary of the Treasury, and indorsed: "Proposals for Electric Light and Power Plant, Post Office Building, Washington, D. C." O. L. Spaulding, assistant secretary.

The New York Telephone System now has
20,500
Telephone Stations in New York City.
*There is accommodation for more.*
Rates from $90 a year.
NEW YORK TELEPHONE COMPANY,
15 Dey St. 962 Broadway. 115 W. 38th St.

PATENTS.
TRADE MARKS. DESIGNS. COPYRIGHTS.
CAN YOU OBTAIN A PATENT?
Send me a model or drawing of your invention, and a description, and I will examine same and advise you promptly. My fees are moderate in all Patent matters, and I can obtain a Patent in the shortest possible time.
All patents taken out through me are given special notice in the leading journals of the country, thus bringing same widely before the public without cost to inventor.
References: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.
EDW. S. DUVALL, Solicitor of Patents. Loan and Trust Bldg., WASHINGTON, D. C.

DIXON'S GRAPHITED WOOD GREASE
FOR TROLLEY CAR GEARS.
*ABSOLUTELY PREVENTS NOISE AND DOES NOT OOZE OUT OF GEAR CASE.*
"LASTS THREE TIMES AS LONG AS ANY OTHER LUBRICANT."
JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

FORT WAYNE ELECTRIC CORPORATION
FORT WAYNE, IND.
APPARATUS FOR
ARC, DIRECT-CURRENT AND ALTERNATING INCANDESCENT LIGHTING AND POWER TRANSMISSION.



MAKING SOCKETS OUR SPECIALTY
Write for full particulars, free Samples, etc. We make many brands of
SOCKETS
Have saved others money. Can save you.
H. T. PAISTE CO.
CHICAGO PHILADELPHIA

Climate Cure
For Weak Lungs, Weak Throats, Weak Bodies.
I Know Where it May be Found.
Would you like to know, too? Just a hint of it here—
The Health Resorts of ...New Mexico
—particularly LAS VEGAS HOT SPRINGS.
Write to me . . .
W. NICHOLSON,
Great Northern Office Building, CHICAGO.